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GRAPHICS BY ATi

apc EDITOR'S CHOICE JUL 2003

PowerColor ATI
Radeon 9800 Pro
July 2003

HOT

PowerColor ATI
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November 2002

pc world RECOMMENDS

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July 2003

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PowerColor ATI
Radeon 9600 Pro
September 2003

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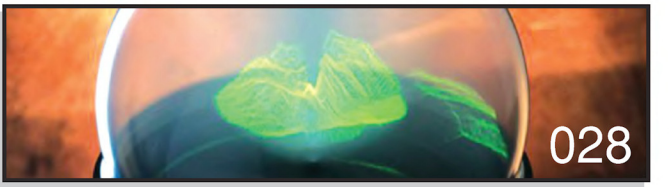
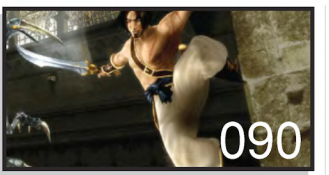




X-Ray

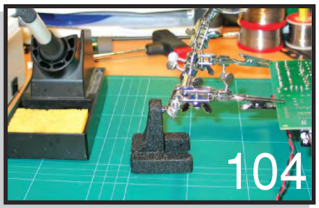
Depth-charged 3D screens 028

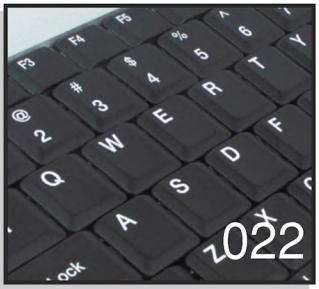
When interactive 3D games bombed so many years ago, we were fairly certain they wouldn't make a comeback. Well, they have. Sort of.
A number of LCD manufacturers have started using special layers on their displays to provide a true 3D experience, without goofy glasses or a heavy visor. Nathan Davis has all the dirt on this new technology.

Free stuff

Feature: Refining the PC 042

Like the dinosaurs, PCs evolve too. Lucky for us, we don't have to wait 65 million years for it to happen. The cracking pace of technology assures that we'll see a few revolutions before our time is up, be it by meteor or the hourglass. John Gillooly was set the task to co-ordinate the information-gathering, and armed with a hastily-aquired Delorean, a pen and some papyrus, we have a sparkling article with the latest developments on PCI-Express, EFI, wireless and small form-factor motherboards. It's so juicy with content, our mouths are watering.

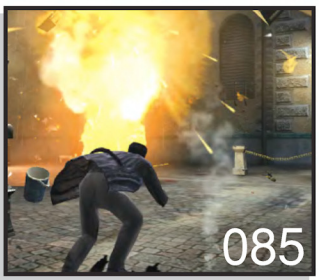


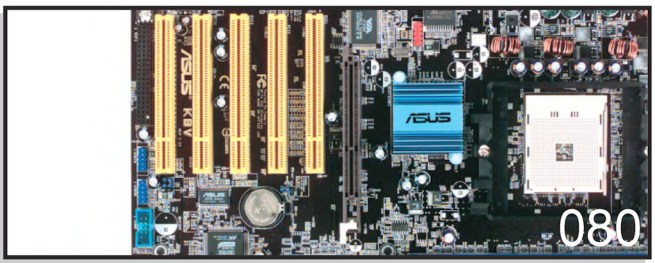


Head to Head

Bad-assed mobos 036

It's only been a couple of months and there's already a truckload of Athlon 64 motherboards available for purchase. Like any range of products, there are going to be winners and stinkers, and John Gillooly is here to sniff them out. Donning the HAZMAT suit and Geiger counter, John's run a ferociously comprehensive set of benchmarks – when the motherboards weren't pleading for their lives, they were screaming. The outcome?
A jewel of a report on the crème da la crème of Athlon 64 motherboards. Turn to page 36 for a detailed look-see.





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(ajb.publishing)

April 2002 – March 2003: 27,310

Patagonian timewarp

Welcome to that magical time of the year when we all pretend that Christmas is really in November, and that it's the only time of the year when we truly appreciate each other, and that every other month of the year is a barren wasteland of no game or hardware releases.

Merry Christmas everyone! Yay! What a mighty year. It's not over yet, but there's been some happy excitement to keep us thinking about things apart from war and grief. Like the Great Patagonian Toothfish Chase, or the glorious Taikonauts. But that's reality, and we don't have time to spend too long dwelling on that when we can watch and wonder at NVIDIA writhing, then clawing back to at least parity. Or our excitement as the Athlon 64 launch approached, then amazement at Intel's most amusing act of trouncing bastardry.

Trouncing of a non-amusing flavour was the fruckers who did over poor Gabe, and the rest of us, by giving us a Half-Life 2-free Christmas. While we feel sorry for Gabe and his team, we feel sorrier for ourselves for not having the game we wanted. This is all tempered by the dissatisfaction with Steam. Want to see dissatisfied? Read Tim Dean's page this month. I've never seen someone so calm so angry.

Ironically, Doom 3's delay was suspected to be due to the shock the id guys may have experienced on seeing HL2 and realising they had better pull their collective fingers out and do a better job. Or King John was pre-occupied with building his rocketship. Perhaps.

Anyway, none of it really matters, because Max Payne 2 and XIII are more than enough PC shooter action to satisfy. Both are state of the gaming art. It's odd, with the Cel shading used in XIII we were all expecting to play the game feeling as though we were watching a cartoon. The opposite end result is that it's actually turned out to be one of the most immersive FPS experiences ever. Miraculous. Max Payne 2 is just plain trippy. It's utterly brilliantly trippy. The 'dream sequences' are hardware trippy. The 'post processing' effects are clever and artistic use of games hardware.

And back in the living room Xbox Live is kicking in. Without prejudice, I have to say that the Live model for online console gaming is vastly superior to PS2. The simple feature of having one centrally stored 'id', which is automatically carried from game to game, is something that's a welcome relief after years of managing different nicks and online systems as a PC gamer. The games are picking up in quality too. Crimson Skies is just beautiful and Top Spin tennis is fantastic multiplayer fun.

I hate to say it, but the PS2 is drowning in shovelware. Too many mediocre games, not nearly enough stand-out games. That little whinge over, Prince of Persia – Sands of Time is possibly the best PS2 game of the year, and next month we're expecting Manhunt, which will raise a few eyebrows, I'm sure.

Right. I'm getting ahead of myself here. About a month and a half ahead of myself. The year is racing to a close and the toys are looking good.

Cheers.

Ben Mansill
Editor

Atomic Cover CD

On this month's CD are seven complete tweaking tutorials, and some hella useful tools/utilities.

If Satan had said your soul would be banished to the far reaches of hell if you ever said the word 'Atomican' again, the only other option you'd be left with is 'Tweaker'. Not that such a situation has arisen, but it goes to show how dedicated to system tuning we – as Atomicans – are, be it through hardware, software or spiritual enlightenment. Consider this CD your shrine of prayer, performance saviour and burner of incense!

CD

No.6
Triple tweak

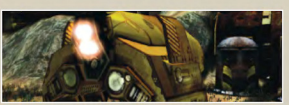
Modkit supplement

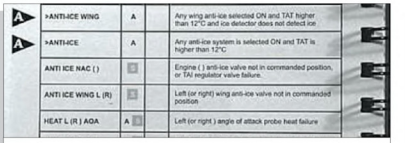
We felt bad that we weren't able to include the most important files required for Quake 3 modding on last month's CD, so now that we can, and here they are. Included in this mini-super section is the GtkRadiant level editor, its update and the Quake 3 DLL source code.

Games Modki

Benchmarks

What good is all of this tweaking goodness if you don't know how successful your efforts are? It's definitely not a situation we could idly watch, so to unite this lovely disc of performance bliss we have Aquamark 3, 3DMark03 and the combined tweaking/benchmarking goodness of SiSoft SANDRA 2004.





Tweaking guides

We set out this month to deliver some serious content for the CD, and you're surely not going to be disappointed.
Atomic has gone all out to provide tweak guides for:

- Windows;
- Linux;
- Quake 3 Arena;
- Morrowind;
- Half-Life;
- BIOS tweaking; and
- 3D graphics tweaking.

With so much potential performance just lying dormant, it'd be an injustice not to do some heavy-duty guide-writing. We recommend that you take them on one at a time, as excessive consumption may lead to withdrawals.

Tweaking tools

What better companion for a bunch of tweak guides than a tidy array of tweaking tools? These utilities will help you to get the most from your box without having to dig through your registry or edit configuration files. We picked the fittest finalists from a range of applications, including RivaTuner, SiSoft SANDRA and jv16 PowerTools. What's on the CD is the distillation of these tweaking perfectionists, so do yourself a favour and go absolutely nuts.

Compression tools

Necessary stalwarts in the cover CD army, we've included the top four archiving utilities so you can access the files on the disc. They also happen to be handy if you need to compress stuff. . . because it's too big! What a coincidence!

Quick guide

Benchmarks
- Aquamark 3
- 3DMark03 update 330
- 3DMark03 build 320

Boot sector
- Omega XP Catalysts 2.4.87
- VIA AC'97 drivers 3.7
- SiS Xabre drivers 3.10.58
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- VIA Hyperion 4in1s 4.49p2
- SiS IDE drivers 2.03
- ATI XP Catalyst bundle 3.8
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- Atomic Half-Life tweak guide
- Atomic Morrowind tweak guide
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- Atomic BIOS tweak guide
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- WCPUID 3.1a
- CableNut 4.08
- CableNut XP/2000 update
- Cacheman 5.5
- jv16 PowerTools 1.4.1.242 beta
- Registry Healer 4.0.1
- Rage3D Tweak 3.9
- XP Quake 3 DLLs 1.32
- Thunderbird Quake 3 DLLs 1.32
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- DirectX Eradicator 1.09 beta 2
- SiSoft SANDRA 2004 9.89
- StartupRun 1.10
- CPUIdle Pro 6
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- Linux stable kernel 2.4.22
- The Atomic Gateway Kit 0.2
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SHORT CIRCUITS

NVIDIA recently changed the name of its 'Detonator' unified driver suite to 'ForceWare', coinciding with the official release of its WHQL-certified, 50-series graphics card drivers. Just five days later, NVIDIA made available a tweaking tool, called 'nvSystemUtility', designed for motherboards using nForce2 and nForce3 core logic chipsets. In the face of growing pressure from ATI and continued accusations of benchmark cheating, NVIDIA looks to be refreshing the software end of business.

Atomic was surprised to hear that Doom 3's renderer will be capped at 60 frames per second. According to John Carmack, there's little point rendering any faster as the game would simply be producing identical frames. Additionally, a framerate limit removes movement problems, which were also present in Quake 3. We hope it's only for multiplayer, because a 60fps cap is going to make for some damn uninteresting benchmarks.

With mobile phones becoming slightly more interesting, we're pleased Vodafone live really kicked in. Particularly with the real-time World Cup coverage. Their new GX20 handset has pleased us with its rather amazing 320 x 240 pixel resolution. That's about double the res of any other mobile screen on the market. Perfect for watching the amusing pummelling of the little teams.

The Recording Industry Association of America is sure keeping the lawsuit brand hot. Eighty new suits have been filed against tune swappers, who were warned beforehand by mailout. Is it time to shut down KaZaA?

NEWS

Sony – 20,000

Sony looks to slash 20,000 jobs globally by 2006.

Over the next three years, Sony plans to trim 20,000 personnel from its global workforce as part of a broad restructuring, called 'Transformation 60'. The restructure would see the consolidation of the corporation's business and financial interests. Sony said its ultimate goal was to cut fixed costs and to reinforce the company's focus on semiconductors and future technologies, including liquid crystal displays, broadband and Blu-ray devices.

In a press release, Sony stated that '[it] will develop convergence strategies in the home and mobile electronics sectors, by concentrating engineering resources and utilising the power of core semiconductors and devices.' The press release went on to list exactly what is contained within these sectors, with 'home' including the PlayStation, PlayStation Portable, and CELL – the media chip that will apparently be used in Sony's next console. To coincide with this focus on newer technologies, Sony said it would be channelling more funds into research and development, with plans to spend around one trillion yen (AU$13 billion) on emerging tech over the three-year restructure.

You should purchase a PS2 to show your support for Sony in these tough times. . .

The word 'global' did include Australia, however, managing director of Sony Australia, Toshikazu Mashima, said that there were no plans to cut employees from the company's workforce here. 'There is no specific plan to reduce our headcount at a local level,' he said. According to Mashima, Sony Australia only recently went through its own restructuring to accommodate changes in business.

Part of 'Transformation 60' included a standardisation of components throughout the company. At the moment, Sony has over 800,000 parts floating around in devices. The company hopes to reduce this number to 100,000 by 2005. By this time, Sony would also be looking to have trimmed down its list of current suppliers to 1,000, from 4,700.

Despite this foreboding news that one of the world's largest companies was looking to make workers redundant, it's certainly all good news for gamers – even though sources suggested that flagging sales of Sony's PlayStation2 console and the drain of R&D costs on games might have been partly responsible for the restructure.

To add to Sony's troubles, the University of Wisconsin filed a lawsuit against both it and Toshiba, stating that the companies infringed on a patent licence. The patent was believed to be involved with the manufacturing process used to make the Emotion Engine – the central chip in the PlayStation2 – which Sony and Toshiba developed together.

It's believed Sony was using captured alien technology to stay competitive. It seems Sony has now completely reverse engineered their UFO and desperately needs another to stay ahead.

A spokesperson for Sony was unable to comment on the lawsuit, stating that it was standard policy not to discuss any pending legal proceedings. The company was also tight-lipped on how the lawsuit would affect sales and development of games and consoles. But the fact that Sony would be increasing spend in home entertainment over the three-year restructure suggests that gamers, especially those who have invested in Sony's PS2 Online service, won't be left out in the cold.

On the bright side, notebooks and digital cameras have been successful sellers for Sony, with the company stating they were solid areas of growth.

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Oz Xbox Live

In the month of October, both Microsoft and Sony officially launched their respective online console gaming services, making the necessary hardware required for connectivity available for purchase, as well as promoting the services on their consoles' websites.

While the services have been active and accessible for a few months now – particularly Xbox Live, featured in *Atomic* back in *issue 26* – it's only now that users can locally buy the adaptors, software and equipment needed to hook up. Currently, there are 20 games on shelves compatible with Xbox Live and Microsoft has 50 more in the works. This is thanks primarily to the lead time developers have had since the announcement, and launch, of Xbox Live.

In comparison, Sony's PS2 Online service had somewhat fewer titles available for prospective online players – especially during its beta test. This situation has changed dramatically though, and at the moment there are around 20 titles compatible with the PlayStation2's online service.

Along with software, the Xbox Live kit also comes with headphones and a mic.

The appeal of online connectivity to console players is strong; the once impenetrable domain of the PC is now being invaded by unlikely competitors. The situation is also beneficial to broadband providers as consumers who once had no reason to invest in ADSL or cable now do. So it comes as no surprise that Xbox has joined forces with Australia's largest providers of broadband – Telstra and Optus – to push the service to potential customers.

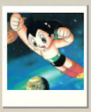
These services don't stop at games however. As easily as players can race one another in MotoGP, they can just chat via headsets provided in the Xbox Starter Pack. Additional content is also available for download, including extra maps, models, sounds and patches. Tom Clancy's Splinter Cell was one of the first titles to take advantage of this feature by making available two new maps for owners of the game.

Although both Microsoft and Sony's online offerings are solid, they're outmatched by the raw flexibility of an Internet-connected PC. It'll still be a while yet before the space on your computer desk is occupied purely by a console. LB

WHAT'S HOT

- Tweaking – power for pretzels
- Simpson's Hit & Run – Simpson's made fun
- Uhu tac – the yellow substitute
- Quantum computing – leaping to the fore
- Taikonaut – Chinese in space!

WHAT'S HOT



- Upgrading – losers' way out
- Simpson's Skateboarding – more like 'skateboring'
- Blue tac – falling off the wall
- *Quantum Leap* – jumped to its death
- Astronaut – as old as Astroboy

atomican

Over the past month, Amiga4eva has been sharing his creative talents with us all with his excellent 'Legend of Atomic' threads. Surreal and fantastic are two words that I would use to describe them. You can check them out for yourself at: www.atomicmpc.com.au/forums.asp?s=1&c=1&t=23126, 23266 and 23835.

Unless you've been hiding in a cave near the Afghanistan-Pakistan border with your head in the sand, then you've probably noticed the nudie Atomican thread (forums.asp?s=1&c=1&t=24439). Atomicans everywhere have been tossing aside their clothes in an effort to outdo each other in creative ways to cover up their pink bits. So much pale skin was illuminated that at times I had to put on a pair of sunglasses out of fear of burning my retina. In the end though Kommando came out on top and was the winner.

As well as being open physically, Atomicans have also been opening up other more clothed parts of their lives in DonnaGem's 'Something You Don't Know About Me' thread (forums.asp?s=1&c=1&t=23923). It's great to see the openness that everybody in the community has with each other and to finally find out which Atomican has a toenail fetish.

Following on from Propellerhead's four-year-old last month, MaXXimus tells us about his three-year-old daughter who is a keen Diablo 2 player (forums.asp?s=1&c=1&t=24300). At this rate, we should have our first two-year-old hacker next month, a one-year-old with PlayStation calloused fingers in January, and a newborn securing NT4 servers after that.

Trying to find information on the latest and greatest games can be difficult at the best of times. What would be great is if you could look at a thread on the forums with links to all the major game websites with screenshots and release dates. Fortunately chris_hart had the same idea and decided to do exactly that. Check out forums.asp?s=3&c=12&t=2756 and start waiting. Now if only games came out when the news said they would...

And, as always, remember that winning a competition doesn't always depend on which brand of mouse that you are using.

Wilkshake

POTM 31

www.atomicmpc.com.au

The great and amazing *Atomic* Nekkid thread is most certainly a solid part of *Atomic* history, and most likely, Internet history.

Easily the fastest growing thread in the history of our forums, the *Atomic* Spirit showed through as one by one, Atomicans showed us funny and creative ways to get Nekkid, while still covering up their bits with Atomicware.

The winner was Kommando, who managed to use the Atomic CD in a new and inventive way. By default, he is indisputably POTM winner, and we trust he'll use his new Logitech MX700 for the reasons its designers intended.

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WCG finals in Korea

Stuart Denham broods over the World Cyber Games Finals.

Offering drug scandals, country versus country brawling, smashed hotel rooms and the occasional hospital trip, this year's WCG Finals in Seoul, Korea, had it all. Rather than boring you with the facts and figures we've poured over for the last month (www.worldcybergames.com for full results), we thought we'd take a look at one of the scandals which marked this year's WCG as the most entertaining yet.

ABOVE: Nick Hogan, the Australian Starcraft Brood War champion. Dun us right proud!

Do you think you're a hardcore gamer? Do you while away the morning hours to the sound of AWP shots at long distance? Think you've made gaming an obsession? Well we at *Atomic* did, until we heard the plight of Canadian Brood War player Smuft. Smuft – Canadian BW champion and noted pro-gamer among spectators – is the very definition of 'going overboard' when it comes to gaming. Let me set the scene for you a bit.

Smuft, being as skilled as he is, spent several months in Korea as a professional gamer. Not a bad way to make a living in a country where to be an elite player is to be a celebrity. Well, apparently, during his months in Seoul Smuft ran a little short of funds, which threatened to cut his reported 14-hour-a-day gaming addiction. So, allegedly, being the resourceful man he was he began smuggling cannabis into Korea via a friend in Canada, and rounded out the operation with a Korean contact. Well karma being karma it wasn't long before, apparently, Smuft's Korean friend was caught and instantly gave up his partner's name to the authorities.

We heard that Smuft was surprised when he received a call from Korean police investigating his actions and thus proceeded to hide out for a few days and lay low. Finally after three days he turned himself in and was released a few days later on the grounds of insubstantial evidence on the condition he may not leave the country while the investigation is ongoing. We were told that without evidence the police finally choose to deport Smuft to his native Canada and the book was closed, at least to Smuft's thinking.

ABOVE: While the Protoss might be immune to the cold, our fragile minds are quite vulnerable to alien nudity.

Well WCG 2003 crawled around the corner and there was Smuft, up to his neck in Brood War and smashing the Canadian competition. After fighting to obtain the second place and a spot on the Canadian team, Smuft was pumped to show his skill on the international stage. The Finals come and what would you know, Smuft landed at Inchon airport, Korea, and was detained by burly men in all-too-familiar Korean police uniforms. After months of alleged drug peddling, gaming obsession and country-wide domination, Smuft was deported straight back to Canada, to sit with the rest of the spectators and wonder what could have been.

Feeling a bit better about your eight hour Halo party now? Stories like these have been cropping up over the last few years as pro-gaming has become a more mainstream and easily accessible avenue of entertainment. There is no doubt that game developers are starting to make games with a viewpoint of 'will this game sell for itself or for its competitive potential' and we are creating more and more avid gamers with this. Let's not get ahead of ourselves though, these are just games to most of us (well most of you).

Without the need to fill space we feel it would be an injustice not to recognise Australian Unreal Tournament 2003 champion Snoop*dx who came third in Korea and earned us our first ever medal at a WCG event, way to do us proud Snoop! Another WCG over, another five day caffeine binge while scoffing popcorn in front of the HLTV.

We think this year has really given us an insight into the depraved nature of the obsessive gamer. So remember, if anyone ever disses your hours of gaming bliss, first blame the game companies, second your clanmates and if all else fails... blame Canada!

SD

Everything is anything!

Dan Rutter shakes hands with Mork and talks about Nano Nano(tech).

There's a technological revolution coming that promises to make pretty much every gadget we use today look like ancient history. I'm not even talking *Bronze* Age, people.

Ultra-small-scale technology is bringing new aspects of molecular and *sub*-molecular weirdness into the macroscopic world. We are already surrounded by devices that rely – for their basic operation – on ultra-small-scale effects: transistors, LEDs, LCD monitors, but this is just the start.

Soon, we'll be dealing with things that don't just have little specks of photon-tunnelling, electron-hole-shuffling quantum magic inside. Instead, the whole darn *object* will behave in a way that'll leave you wondering, vaguely, whether you ought to burn yourself for being a witch.

By the manipulation of quantum dots – 'artificial atoms' that confine an atom's-worth of electrons in a rather larger area – we can create materials that have some of the properties of real elements. Change the electron population in the quantum dots – probably by the application of electricity, but maybe optically or via some other means – and you change the material.

Exactly *how* such 'programmable matter' will be able to change depends on many variables whose values we don't quite know yet. You certainly shouldn't hold your breath for an anonymous brick of stuff that can turn into fried chicken, bone china or 24-karat gold depending on the voltage applied to its ends. Quantum dots can only exist in a matrix of some other substance, which will strongly colour the behaviour of the final material.

But materials with unheard-of toughness, hardness, conductivity and insulation abilities, and the ability to change from one mode to another when needed, are a lot more feasible. So you can have that sci-fi staple – the 'leather' jacket that turns into high carbon steel when someone shoots you, or you fall off your motorcycle.

And yes, all those trippy super-heavy elements they talk about in *Star Trek* can be simulated this way, too, without the inconvenience of picosecond half-lives and lots of hard radiation.

Quantum dot fabrication is one of the more feasible kinds of nanotechnology – technology that deals with things that have features on the billionth-of-a-metre scale. Nanotech tends to make geeks think of tiny nanobots to scrub fatty deposits out of arteries (Discovery Channel version) or turn people into Borg (Sci-Fi channel version), or perhaps horrifying tides of self-replicating grey goo hell bent on eating the whole planet.

> . . . you can have that sci-fi staple – the 'leather' jacket that turns into high carbon steel when someone shoots you.

Long before anything like that can happen, though, we'll be using nanoscale tech to make bulk materials.

Substances with low-level structure that's controllable, one way or another, could mean magic morphable materials.

This won't mean you'll be able to buy a grey blob that can flow out into a couch, or flatten into a video screen, or turn part of itself into a steak dinner – athough nanoscale assembly may give rise to general purpose nanofactories that *can* turn out any of those things.

If all you want is morphable furniture, though, that's plausible. A hybrid nano/micro polymer-machine, Silly Putty with muscles, which can flow and foam out into whatever shape and, within limits, size, you want.

Presto – the first really good sofa-bed.

Like composite materials today, morphable materials will start out being incorporated into components of more traditional devices, making things more able to do whatever it is that they do, without transforming the basic nature of the thing any more than carbon fibre has transformed the basic nature of the tennis racquet.

Beyond that stage, though, really dramatic changes could happen. Not least of them would be a vast reduction in the amount of space people need to live a luxurious life.

Think of all the five to 10 room houses out there that only have one to three rooms in use at any given moment. Now think of how much space you'd save if not only your furniture, but various other things, could change shape at will.

Dining room, TV room, bedroom; one room.

If you want separate areas for separate people, you'll be able to fit a lot more stuff into a lot less space. A bed could turn into a desk. A workbench could roll itself up into a blob, and then unroll when needed, replacing all the tools in the right place.

And, given more advanced morpho-stuff: Want a picture on the wall? Just dial one up. Make the whole wall a picture, if you like. Make it a TV. Make it transparent, turning one side into a camera array and the other into a one-way viewscreen.

Heck – amalgamate the kitchen and the bathroom!

Now, morphing your computer chair into a toilet might not be quite the technological advance you're looking for. Well, not one that you'll *admit* to wanting, anyway.If you can get past the 'ick' factor, though, it'd be a very good thing for the world if we gained the ability to have waste never leave the house, but rather be nanotechnologically reprocessed into raw material for the next piece of furniture, suit of clothes or dinner.

Far-future sci-fi likes to talk about humans losing individual identities. A long time before anything like that can happen, though, *objects* may lose identity, as they become able to be whatever we need at that moment.

And then, the kids may well have a very hard time seeing many big differences between a modern PC and a stone axe.

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Geek chic

Are you wired for style? In the future you may be. Ashton Mills investigates.

I don't know about you but shopping for clothes holds about as much interest for me as eating tarmac or watching re-runs of *Neighbours*, but in the near future that may change.

Developments in the realm of wearable computing, and in fact technology in general, are progressing rapidly. Clothes you buy in years to come may not just look good, they might actually *do* something.

Already you can buy trendy ski gear from a company called Burton that incorporates the textile equivalent of an Apple MP3 playing iPod – the sleeves of the Burton Amp jacket feature in-line fabric buttons for fast forward, rewind, stop and play to control the built-in player. And totally waterproof, so you can stack on the slopes without fear.

> . . . the sleeves of the Burton Amp jacket feature in-line fabric buttons for fast forward, rewind, stop and play. . .

At the Massachusetts Institute of Technology a special jacket has been developed called the Puddlejumper that features stylish electro-luminescent lamps sewn into the fabric and wired to electronics. The lights are activated by, and mirror, the pattern of rain striking it.

And recently the boffins at electrical giant Philips have been playing around with the integration of electronics in clothing to measure body temperature with the aim of possibly being able to heat or cool the body accordingly.

But all of this is really just the tip of the iceberg of creative thought that's going into the possibilities of merging circuits and clothing.

In the States, the US government is backing a project to create smart uniforms for the military that are capable of changing colour to blend with the environment, which would be a truly impressive ability. For civilians, the Saint Martins Innovation Centre in London is working on integrating electronics into fabrics for the purpose of turning them into giant pixel displays. Ostensibly this will be used to allow wearers to download new fashionable colours and patterns, and thus always be hip and cool, but we all know geeks will re-program them to display colourful online colloquialisms such as 'pwned!' and '<— I'm with nublet'.

In Scotland, development is well underway on creating a vest that can monitor and transmit the vital signs of its wearer. The initial application is in medicine but this clearly has military uses as well – and just imagine if it were coupled to injections for adrenaline or pain killers, determined by an onboard computer sewn into the uniform itself.

And then there's fashionable clothing gear that aims to incorporate your geek gear. Levi's actually released a limited clothing line in 2000 that included special cabling sewn in for a mobile phone, collar microphone, headphones and an MP3 player. It was only Levi's extending its little toe into a pool that will eventually become the fashion water supply, but the fact they pulled it off three years ago shows that this sort of integration has been on the minds of both electronics manufactures (as in the case of Philips) and clothing producers for some time.

While Levi Strauss and Co's foray into the convergence of current technology and clothes is a sign of what's in the future, it certainly isn't the only direction or influence from which tomorrow's clothing will come.

The Eurowearable conference held in England in September this year showed off some pretty nifty garb that included a jacket with built-in coolant piping to keep you cold in hot temperatures (this thing looks like a stillsuit from Dune, go figure!), a coat containing 'liquid ceramic' (normally used in the aerospace industry) to insulate against extreme cold, and a shirt woven with titanium fibers that – get this – literally de-creases, essentially ironing itself, when heated by a source such as body temperature! Somehow I think they'll find a market with, oh, the entire male population of the planet.

Then there's the Japanese, who have started playing with a technique known as micro-encapsulation, or the embedding of substances (such as essential oils, among other things) between the fibres of a fabric. Not only will this enable such ground breaking inventions as auto-deodorising undies but cool stuff like rose-scented lingerie or mosquito repellent t-shirts could be likely by-products.

A (probably unscientific) study I once read concluded that women are attracted to the smell of talcum powder (and the equivalent for men was, believe it or not, doughnuts) so I think a fancy shirt smelling slightly of talc would be a righteous hit at a nightclub. Yes, yes I know you could just splash some Johnson's baby powder on a shirt, but it's just not as *cool* now is it?

Interestingly, the merging of technology and clothing isn't just about making it happen, but making it happen seamlessly (no pun intended). The goal, it seems, for many of the players now entering the market is to make clothing that integrates with technology so well that you wouldn't even know it's there. No one wants to lug around batteries and an on-board computer, so certainly clothing with any sort of intelligent functionality is going to have to cross these hurdles in order to be practical.

But, like everything else, where there's a will there's a way. And if there's an industry with the funding and the artistic zeal to make it happen, the fashion industry is it. And wouldn't that be an interesting turn of events? The day when geeks go on a clothes shopping spree of their own volition – to kit-up in the latest that wearable technology has to offer!

This is where
I tried my best moves
on Rebecca.

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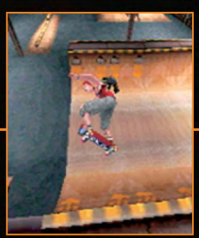

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Steaming pile

Tim Dean makes the mistake of installing Valve's new DRM nightmare, and lets off some steam.

Let me tell you a little story about an application I like to call Steam.

After purchasing a new hard disk and reinstalling Windows from scratch, I wanted to load up all my games, including Counter-Strike and Day of Defeat. When reinstalling CS, I noticed that you needed Steam to get version 1.6 – oh well, might as well install this Steam thing and see what the fuss is all about at the same time. Big mistake.

It's only the hours of crap I had to go through to get everything working that has stopped me from deleting all the guff and going back to just plain old CS 1.5, as I'd have to go through that crap all over again should I wish to upgrade down the track.

So, my experience went a little something like this: try and find the Steam client by itself, because I already had most of the HL and CS patches up to 1.5, and I didn't want to download 380-odd MB of the stuff again. So trolling, trolling, trolling and nowhere can I just find the bloody client. Finally, through the powers of Google, I managed to dig up a client-only download and get that installed. About five minutes of hard disk crunching later, Steam had commandeered my HL install, and copied it lock stock and DLL over to the Steam folder. Nice, so now I had twice the hard disk space taken up for the one game. Then my Net connection maxed out. Right, it must be updating. It was, and I found the Monitor window in Steam, which graciously told me it was updating HL, CS and DoD. But it didn't say from where.

Now, those lucky buggers over in the US with uncapped broadband might not care about this little detail, but over here I like to download from an uncapped site – either my ISP iiNet directly, or from another PIPE ISP like Pacific. Nup. Can't change any settings to tell it where I am. I have heard some ISPs, like BigPond, are planning to have Steam update servers, but they weren't around when Steam was released, and I still can't point my client to it manually.

Which brings me to the UI of Steam. It's so lowest common denominator that Russel and Whitehead will need an appendix to their manual on maths to account for this new number (I think it's irrational). There are very few settings that you an adjust in Steam, and you really don't know what's going on behind the green-skinned surface.

Furthermore, you just have to accept the updates Steam sends. Sure you can cancel them, or tell it not to automatically update, but that'll limit the servers you can run on. And you can't load some updates and not others, or some custom content.

> Every time you load up a game, it 'verifies' the content, which is a nice way of saying it's checking to see if you're using any pirated software, among other things.

Also, the documentation on Steam is scarce, so other mod makers are having great trouble porting their mods to Steam.

And then there's playing through Steam. Every time you load up a game, it 'verifies' the content, which is a nice way of saying it's checking to see if you're using any pirated software, among other things. This process takes time. Sometimes a very long time, if the Steam servers are overloaded, which they often are. When Steam was launched the servers just couldn't keep up, and many people couldn't play at all – even though they had paid for legitimate copies of their games. Valve has acknowledged this problem, and is planning to install new servers. Good one, but it's a bit late guys. Maybe if they had enough at launch. . .

I have Steam crash about 40 percent of the time when loading DoD. It just freezes. Apparently this is a bug in Steam, and the game hasn't actually frozen, it just looks that way (is there a difference?), and if I can be bothered waiting up to 10 minutes, the game will actually load. Also, it tends to crash about 50-60 percent of the time when the map ends and the new one is loaded. So, CTRL-ALT-DEL, exit Steam and try again. . .

Dunno who programmed and bug tested this nightmare, but they should sit themselves down in a comfy armchair by the fire, wearing their best smoking jacket, with a snifter of cognac, then reflect and take a long, hard look at themselves – and really re-evaluate their lives. With luck they'll realise how black their heart really is. Ooh, harsh. But fair.

Finally, one of the craziest-arsed things about Steam is you need to be connected to the Net to play. Even in single player or on a private LAN. That's just madness. I don't have the vocabulary to express how inanely stupidly incredibly moronic an idea that is. You know how Eskimos are supposed to have, like, 30 different words for snow? I reckon you'd need some language with about 50 different words for idiotic, and then I'd need to use them all, and possibly some words that sound like them, and then go back and string them together in lots of new different combinations, and I'd be getting close to describing about a tenth of the moronicness of the nimrod rocket scientist who came up with that idea. Hmmm, maybe I do have the words. . .

In any case, at least Valve is going to change that, so in a future update you don't have to be connected to the Net all the time. Thank goodness.

I haven't even begun to talk about the actual purpose of Steam either – which is the delivery of content bought directly from Valve, or other developers if they pick it up too. That's just not feasible for people with a 56K modem, as they'll never be able to download a couple of CDs worth of game. It'd take less time to walk down to a shop, via the scenic route, and buy a copy there. Broadband caps also won't help even if you do have DSL or cable.

At the end of the day, Steam is here to stay, and they'll probably iron out many of the bugs, but it's still a bloody nightmare in terms of PR. It's almost like Valve employed the Pentagon PR office – you know the ones who did such a great job selling the war to the Iraqi people – to decide how to promote and deliver Steam. It's uncanny.

Arghh. I can't even write about it any more. I'm that over it.

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I saw Pete's skid marks.

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GEARBOX

1 Logitech Extreme 3D Pro

SUPPLIER: Logitech
WEBSITE: www.logitech.com
PHONE: (02) 9972 3711 **PRICE:** $79

This joystick was moulded to suit the human hand, not the tentacles of a deep-space alien. With a definite centre point, and a well-shaped grip, this stick provides hours of blissful gaming. It features six side buttons, a solid throttle, eight-way rubber hat, as well as all the other usual buttons (a total of 12). And it's fully tweakable through Logitech's great configuration utility, which automatically creates profiles for all known joystick compatible games on your system. If you're not after force feedback, this will have you ruling the skies, or the roads, if you're that way inclined.

2 Cooler Master Alloy keyboard (EAK-US1)

SUPPLIER: Rectron
WEBSITE: www.rectron.com.au
PHONE: (03) 9561 6166 **PRICE:** $64

This aluminium-topped, plastic based keyboard is surprisingly sturdy. It's got a laptop-styled key layout and this fact alone maybe a tad daunting, but it grows on you. Because of the low-profile design, there is much less movement required, so once your body assimilates to it, you'll be typing more keys than any keyboard bashing orang-utan could hope to hit. The keys have a good amount of 'dip' too – just over half of that of a standard OEM. For a quality keyboard nothing short of beautiful, this HID is worth every cent. It's also a great hand heatsink.

3 XIDE-PAD II

SUPPLIER: PC Case Gear
WEBSITE: www.pccasegear.com.au
PHONE: (03) 9568 0932 **PRICE:** $39

There's been a madcap mass of mousepad roundups lately. They're the craze now – mouse surfaces, that is. This one will have you gliding your way to the top of the ladder with a nicely textured, yet easygoing surface – but it's different to the pack. Now this mousepad, like everything else, has *two blue* LED lights inside its transparent base. A USB cord powers these, so it would've been really neat to see it also used as a USB hub (not so). The LEDs are trippy, so you'll be blinding opponents from miles away in more ways than one.

4 5.25in PC 12V Cigarette lighter panel

SUPPLIER: PC Case Gear
WEBSITE: www.pccasegear.com.au
PHONE: (03) 9568 0932 **PRICE:** $19.50

Rules were designed to be broken. Heat pumping devices really don't belong in computers – neither does cigarette smoke (a HDD killer). Of course, combining these two evils makes for a damn hot cig' lighter. These wouldn't be hard to make, by why fuss when something as cheap as this is ready and waiting. Not only as a stick lighter, but finally you can use all those car gadgets you've collected over the years. If you dare to spare a 5.25in bay and own a half decent PSU and whether you're a volcanic-human or simply crave heat, this is justice.

5 LED Case feet

SUPPLIER: PC Case Gear
WEBSITE: www.pccasegear.com.au
PHONE: (03) 9568 0932 **PRICE:** $22

That's right. Case feet with LEDs in them – there's some originality for you. Case feet aren't really 'feet' though. More like big stumpy toes. Featuring bright blue LEDs, get set to have your case fully lit with these intense earth-light-blasters.
There is a slight problem with some cases, however, as the inserts may be too large (a little filing may be required). Ensure your case can handle feet with an insert of 7.5mm or larger in diameter and you're off, rocketing, in a static kind of way.

6 Zalman 5.1 speaker headphones

SUPPLIER: Altech
WEBSITE: www.altech.com.au
PHONE: (02) 9735 5655 **PRICE:** $88

Surround sound is cool, but with all those speakers, your room can become slightly analogous to an African monkey jungle, whatever that may be. Several companies have whipped up headphones with hopes of the same ability, but no one has really created a decent set worth pressing your ears against. Zalman have a good reputation for making great speakers, and they actually did a decent job with these babies. Not the clearest ever, but they do have a feeling of surround, and that's Portable Surround Sound Convenience™. Plus, they're as cheap as 44 packs of fried chips.

7 Cooler Master Aerogate II

SUPPLIER: Rectron
WEBSITE: www.rectron.com.au
PHONE: (03) 9561 6166 **PRICE:** $79

This rheobus does a damn fine job at controlling fans via, well, potentiometers – but with style. Four fans and corresponding temperature probes can be jacked into this. Once running you simply select a device (CPU, VGA, CASE or HDD) and control away. Unfortunately you can't turn the damn fans off, but who does that?
If a fan dies or goes below 500rpms, the killable alarm will sound. With a seven-colour backlit dial, and capability for supplying 7-12V of fan juice, this beauty is definitely worth checking out.

8 EL Fan grill

SUPPLIER: PC Case Gear
WEBSITE: www.pccasegear.com.au
PHONE: (03) 9568 0932 **PRICE:** $19.95

Grills are really just there to ensure your fingers aren't snagged and dragged into the finger eater. So, they might as well be powered too. This one lights up with a pleasingly warm and mellow UV glow.
Much like the nose art on a WWII bomber, this baby has the traditional homegirl look, as a graphic tribute to the girls back home. While we have long since given up the fight against rampant sexism in the CS community, at *Atomic* we do feel that the only 'male'-themed fan grills, for the girl gamer (being either Punisher or Spider-Man), could be a tad more dignified.

9 Toshiba 5GB PCMCIA HDD

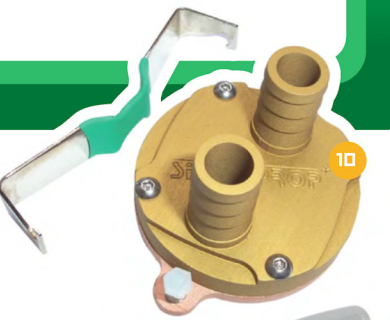
SUPPLIER: Toshiba Sales Centre
WEBSITE: www.isd.toshiba.com.au
PHONE: 13 30 70 **PRICE:** $499.40

This tiny PCMCIA (Type II) device is actually a hard drive – yep, a 5GB HDD spinning at 4200rpm. If that doesn't set your cogs churning, the price might when you consider that an extra $100 will get you only one-fifth the amount of Compact Flash memory. Photographers will love this, but returning a neat real world transfer of 1.49MB/s in DiskSpeed32 on our Athlon 64 laptop (compared to the internal 7,200rpm 60GB at 29.83MB/s), they won't be the only people craving one. Playing movies directly off this is perfectly reasonable, with a rare millisecond pause for high bitrate files. This baby is a compact little gem.

10 Silverprop Cyclone Nexus LX Northbridge water block

SUPPLIER: PC Case Gear
WEBSITE: www.pccasegear.com.au
PHONE: (03) 9568 0932 **PRICE:** $79

Water-cooling Intel 845/865/875 chipsets can be a frustrating affair when it comes to finding a Northbridge water-block that has an acceptable retention clip, especially if you are using a 'serious' system with 0.5in tubing. The Nexus includes an excellent 'OEM friendly' retention clip, Silverprop's proven PluraARC Channel Design for peak efficiency, AMD-style button shims to avoid core-crush, and sexy gold anodising to reduce corrosion. Measuring 66mm x 50mm x 33.50mm, it is also compatible with AMD mobos. Very nice!



11 *Quicksilver* by Neal Stephenson

SUPPLIER: Random House www.randomhouse.com.au
WEBSITE: Neal Stephenson www.nealstephenson.com
PHONE: N/A **PRICE:** $45 (Trade Paperback)

Following on from his seminal sci-fi epic, *Cryptonomicon*, Neal Stephenson takes us back to the scientific revolution in Europe during the 17th-18th centuries. *Quicksilver* is the first of a three book series and follows the ancestors of the *Cryptonomicon* protagonists as they make their scientific mark on the world. At 930 pages the book is just as heavy going as its predecessor, but enough rollicking adventure and thought-provoking science is packed into the book to make this another sci-fi milestone.

12 Zippy Full size keyboard

SUPPLIER: Anyware
WEBSITE: www.anyware.com.au
PHONE: (07) 3856 3999 **PRICE:** $99

This cool blue EL (electron luminescent) keyboard is useful for so many reasons. We can all feel our way around the WASD keys in the dark after so much practise, but now we can also IRC away merrily in the dark. Joy! The brightness of the lighting is just right, and is even across all keys. It's not the keys themselves that glow, but the base upon which they sit. Unfortunately, the keys are flat, like a laptop's, and the space bar sits flush with the chassis, so it's almost impossible to type without making mistakes all over the place. It looks way-cool, but sucks for typing. You decide what's more important.

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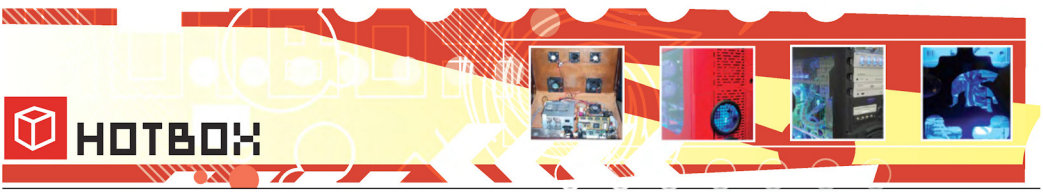
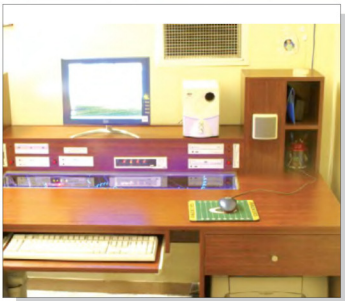


HOTBOX

Austin's Computed Desk



Technical details

- Computer 1: AMD Athlon XP2000
- Computer 2: Pentium 500MHz
- Computer 3: AMD Athlon XP 1800

The Desk:

- Two standard 120mm fans
- Two Antec 80mm 3 colour LED fans
- D-Link DSL-300 ADSL modem
- 3COM eight port hub
- Juster 3D-601 subwoofer speaker system
- Home-made filtration system for air intake
- Hercules 15in LCD monitor, 12 months old
- And a few touches of blue UV paint

I began working on the desk just over 12 months ago. I was tired of having the mass of cables that came with owning two or more computers. The idea started with a good case of insomnia and a few glasses of Shiraz – I thought it would be great to have a computer desk that hid all the wiring. From there I developed the idea that instead of a computer desk, why not make the desk the computer? Thus I coined the phrase, 'Computed Desk'. After a few rough sketches, I took my design to a couple of cabinet makers. Six weeks and $1,300 later I finally had it. All I had to do was cut holes for the components and then proceed to rip my computers apart. There are three PCs mounted inside, the first is my primary machine I work on, the second is old and serves as my ADSL connection and firewall, the third is being used to mess with Red Hat while working towards my Red Hat certification. All these are networked with my VMS, Tru64, Solaris machines and laptops that I'm not willing to rip apart.

THW01F's POWER and the GLORY

Technical details

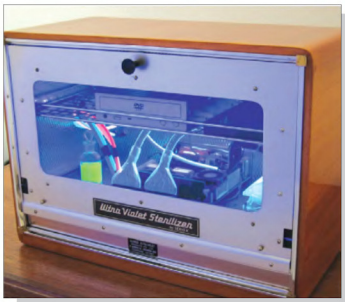
- P4 3.0GHz
- P4C800-D
- Hyper-X 2 x 512 3200
- DVD and CD/RW
- Maxtor two x 40G (RAID 0) and 80G
- RAID controller
- Creative Live digital 5.1
- Antec True Blue 480W PS
- The tasty 9800 PRO
- Single IDE round UV reactive IDE cables
- Four UV reactive orange fans
- Custom wiring with heatshrink and painted Molex boots

The project started with the internals and an un-uber beige fug box. Named the UltraV, she needed an appropriate body to suit her inner glow. The Superflower/Atlas hydraulic case was discovered at a local retailer who sold it for a bargain – $60. The case has a drive cover which lowers with a hydraulic-like effect when a button is pushed. The door had to be manually raised thus the POWER mod was required. This was achieved by moddin an old CD drive eject tray motor, gearing and circuit and now with a push of the button, door goes up, door goes down, door goes up. . .

The case was painted black internally and has a removable sliding motherboard tray. Mods include top blow and frontal suck holes, window with UV moulding, internal bottom and rear mirrors, hand-filed VC RAM sinks from old slot 1 heatsink, custom length wiring harness with Molex boots. The PS has a UV cover fitted, excess wiring removed and temp speed controlled PS and case fans for quiet operation. Some UV paint and UV CCFLs later, she's alive.

The *Seinfield* character called Kramer was originally named Kessler. This is the name found on the buzzer to his apartment.

Justin's Sterilizer



Technical details

- AOpen Micro ATX H340D slim desktop case (butchered for PSU, LEDs, and switches)
- UV cold cathode
- UV reactive tubes
- Two 80mm UV fans
- Blue UV paint and primer
- Two single UV IDE cables
- 4KUS 16x DVD
- Kingston 256MB DDR
- Maxtor 30GB HDD
- VIA EPIA-M9000 EDEN motherboard
- Vial of Shane Warne's urine for those few extra MHz!

I found the ultraviolet sterilizer in an antique store for $10, apparently it once belonged to a doctor. I wasn't thinking of a case mod at the time, I just liked the 60's styling and French polish. After UV reactive case mods began appearing, it was just begging for a retrofit. Unfortunately the old UV tubes were pretty dim so first on the list was a UV cold cathode. When it came to components, the dimensions were just about perfect but I hunted high and low for a short DVD drive to minimise cutting and keep the box close to its original condition. In the end, I avoided cutting into the wood and all that was needed was a couple of fan holes and a hole for the mobo I/O panel. Single IDE cables also helped reduce the clutter. The power supply sits under the false floor, which is where the old transformer used to sit, plus it helps keep things cool. The box sits in the living room and is used as a HTPC and MAME machine.

Steve's Warcraft Box

Technical details

- AMD 2800+ (stock speed at the moment)
- 1GB of Corsair Value RAM
- Gigabyte 7NNXP nForce 2 motherboard
- Two 120GB 7,200 rpm 8MHz Cache Western Digital HDDs in RAID ATA
- Hercules 9700 PRO 128MHz graphics
- Audigy Platinum EX sound card
- Sony DRU 510A DVD burner
- LG 32x/10x/40x CD burner
- Two Antec Cobra UV braided 60cm rounded ATA 133 IDE cables
- One Antec Cobra UV rounded floppy drive cable
- One Belkin UV reactive braided round ATA 133 IDE cable

The front door points to my inspiration for this paint job. The base coat is Black, covered with Pearl marbleiser, then covered with Candy Apple Blue, which gives it great colour variation depending on the lighting. To make sure that the rig doesn't look out of place I have surrounded it with a Blue Hercules Prophetview 15in LCD, and Microsoft Bluetooth Keyboard and mouse. The case is a Coolmaster A710 with a Thermaltake side panel door, which is filled up with five Antec True Blue 80mm LED fans and two 12in blue cold cathode tubes. Blue thumbscrews secure the add-in cards and backing plates and gold thumbscrews the side panel. All fans are controlled and monitored by a Digidoc 5. Power supply is an ANTEC True Power 550. The paint work and airbrushing was done by Rod Charman who I think everyone will agree did an excellent job. I'd also like to thank Chris Yee for his help in sourcing much needed parts for this project.

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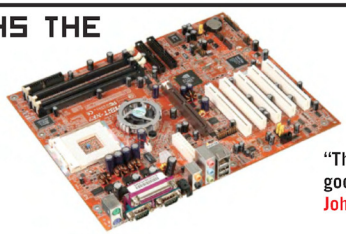
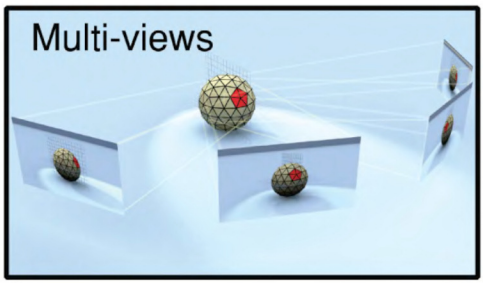
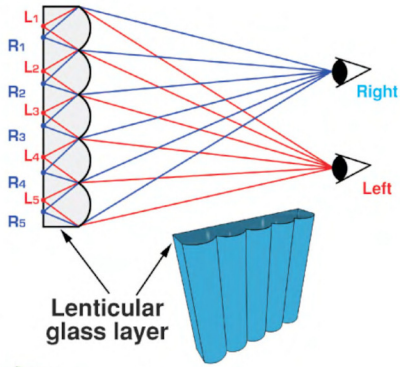
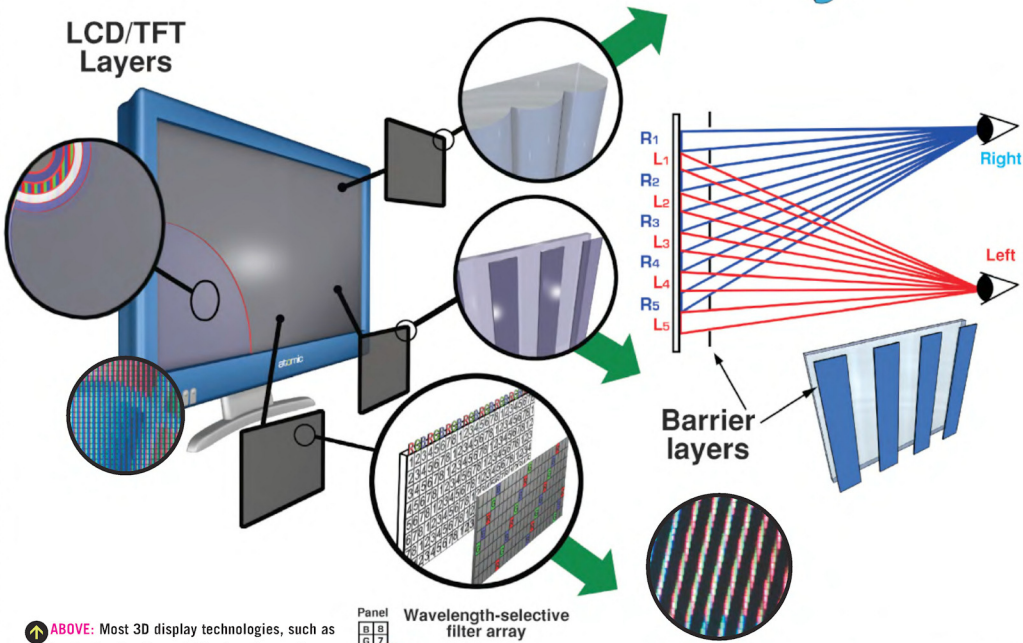


"They're damn good boards"
John Gillooly

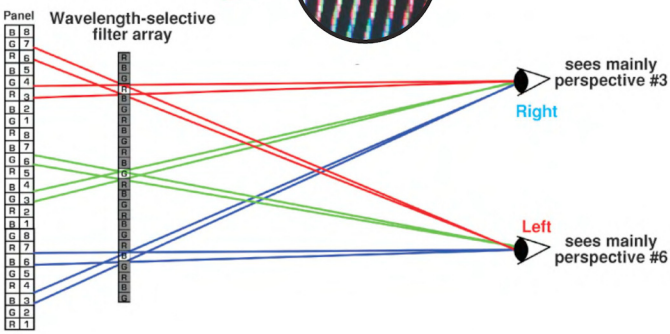


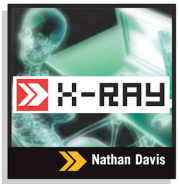
ABOVE: For the 3D effect to work at all, multiple views must be taken of an object – a minimum of two. Setting up multiple cameras is a monotonous job, but in the virtual world it's merely a case of offsetting the digital view.





ABOVE: Most 3D display technologies, such as Lenticular, Barrier and Wavelength, can be implemented on existing LCD/TFT display technology. What they do is redirect the light to each eye using their own special technique. Lenticular redirects the two interlaced images to each eye, Barrier prevents incorrect views from reaching the wrong eye, and Wavelength works slightly like the Barrier method, but provides multiple views using arrays of pixels – creating larger virtual pixels – which are then redirected via the wavelength-selective filter.





Depth charged 3D screens

3D monitors are no longer a sci-fi pipe-dream – the deep reality is you can now own one. Immersed in a new perspective, Nathan Davis dives in.

The possibility that our universe consists of more dimensions than we are currently aware of has been played around with for many-a-purple-spotted moon. Does our perceptible universe have more than the three spatial dimensions we've become thoroughly acquainted with? Dirty load of hogwash or an unrealised reality? Perhaps we may never know, but since we live in the 3D realm we might as well quit theorising so much (or is that just me?) and make the most of it.

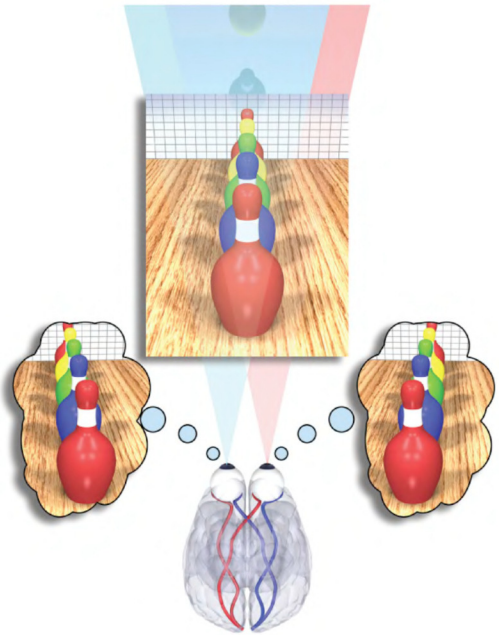
With the extremely slow pace at which the tech of the standard monitor has moved (or not), we are overdue for a thorough revamp. We don't see the current standard range of computer displays as pushing to make the most of 3D – what's the deal with creating 3D models in a 3D game when our monitors can only display boring two-dimensional data? Heck, they're still based around the same few-decades-old technology. If we're going to bother to create 3D objects, they should appear that way. We've decided to name this 'flippant penetration' – it's a pitifully large waste of calculated 3D goodness.

This is where 3D monitors come in, and they've been around for a good while, albeit in a somewhat primitive state. You see, even though quite a few three-dimensional technologies are patented each year, hardly any of these actually make it past their original, partially-functional state. Hardly enough research has been spent on this tech – just small amounts spread over time, although that's primarily because it isn't exactly what's selling at the moment. But how can it sell if it's not even made to be a viably sellable product? Sure, I'll have one of those non-functional 3D-prototype-whatsits. . .

In the coming months/years, this is due to change, with several major monitor manufacturers being approached for mass production and decent support – thus creating a worthwhile and enjoyable purchase.

Where'd you get those eyes?

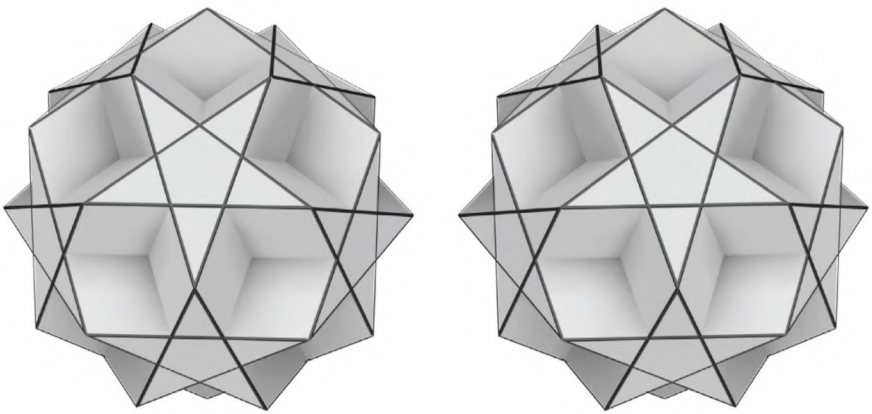
If we were to search for the primary definer of the wonderful three-dimensional ambit, the first subject that should spring to mind is the cool phenomenon we all know as depth, or stereopsis. It can't really be 'seen' as such, but we experience it with the help of brainpower – it's always there ready to jump out at you like the nocturnal nut-snatching chipmunk it is (not your brain, depth – focus!). It pours life into what we see and without it, 'real' 3D as we know it couldn't possibly exist; hence it's only natural to get all sweaty with excitement about depth-capable screens. Here's a technology that can finally emulate how we see things in the real world without the need to wear huge-arsed, uncool devices. Don't even think about VR headsets.



ABOVE: Our brains see the real world by viewing two images, one each from the left and the right eye, creating a depth-filled view.

Basically our brains interpret depth by sourcing a minimum of two images from two different angles, either from both eyes at the same time, or in succession in the case of one eye. After capturing these differently angled 'images', our brains compare and conjoin these together in a special way and send this abstract three-dimensional data to our internal displays (human visors – best resolution guaranteed). Depth is almost like a 'sixth sense'.

Now, with two eyes we simply look at something once and our brains are immediately given two angles. But what about single-eyed depth perception? It's possible, but the need to change position (or for the object itself to change angle) is required and because these images are shown in succession



Crossing the eye

One method of directing a separate image into each eye, and one that works quite well without the requirement of ugly, expensive devices is simply going cross-eyed. Normally our eyes focus on one particular point. This provides depth in the real world, but not when looking at a standard '2D monitor' for instance. The images above, for example, are based on the cross-eyed method. They are two slightly offset perspectives of the one image. If you're equipped to do so, it's as simple as going cross-eyed whilst looking at the centre of these images. When the images have converged, hold your eye position right there and you should eventually automatically adjust to the spectacle, giving off an impressive 3D object (further instructions: **www.jrsdesign.net/cross_parallel_viewing.html**). This is pretty neat, but ultimately this method is tedious and painful and shouldn't be kept up for longer than a few minutes. Also, it requires the viewer to not only have two eyes, but also have the ability to go cross-eyed, hence eliminating a sizeable audience (it's impossible for 5 percent of the world's population, according to one source). Besides, the wind might change. . .

instead of at the same time, the brain can't exactly 'join' them together. So in actuality the effect is quite different, but still 'depthasised'. This technique of single-eye depth viewing uses the physiological depth cue that's known as motion parallax.

In our 3D universe, depth cues are used to determine the type of depth association there is between several items. Without going into too much detail, there are two chief categories for depth cues – physiological and psychological. Physiological includes cues such as accommodation, convergence, binocular disparity and motion parallax. Psychological depth cues consist of linear perspective, shading and shadowing, aerial perspective, interposition, retinal image size, texture gradients and colours. Without explaining each of them in detail, these are basically all the depth cues the human eye is able to perceive depth with, and the more cues that can be used in a single scene, the better the effect. Sometimes, though, certain mixes of these cues in certain situations can screw depth perception right up – creating optical illusion galore. This is why it's really hard to focus on some objects – the effect of depth cues competing with each other.

Motion parallax, as one may guess, is the method of either the viewer or the world moving so as to change the viewing angle of a scene. Objects closer to the viewer will appear to 'move' faster than those further away. For Multi-channel/angle displays, this is a popularly used depth cue because it's an effective technique which can provide viewers with multiple viewing angles without the need for two eyes. Need we mention 'sick'?

Boogeying eyes

Binocular disparity was one of the original depth cues to be used in simulated depth and is the angular difference in a scene between the images projected to the right and left eyes. This technique goes as far back as the 1850s for photography. These stereoscopic photographs (stereographs) were viewed either through a stereoscope or via free viewing (*see above – 'Crossing the eye'*). Sir Charles Wheatstone was the

The Coelacanth fish has been around for some 400 million years. It was alive when dinosaurs ruled the earth, and it continues to survive today in the Comoro Islands.

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creator of the very first stereoscope viewer in 1833 – as photography didn't exist drawings were used. Later these scopes were greatly improved upon and made more portable – devices such as the legendary 'View-Master' (*pictured below*) were developed (and still are). For the unapprised, these are like a pair of binoculars that use thin cardboard rounded reels circled with paired film. When you look into the device, both eyes are supplied with their own

perspective of a scene that the opposite eye cannot see.

This gives off the illusion of depth from the two differently angled takes.

On its own, binocular disparity requires two eyes, and a fairly restrictive viewing point unless used in conjunction with another depth cue. Because they both have great advantages, most motion parallax 3D displays are used together with binocular disparity – each complementing the other. Not only can you see different angles of a scene when moving in front of the display, but also depth perception isn't restricted to people with two eyes. Incredible, but so too is the massive camera requirement for standard video 3D – over half a dozen precisely lined-up cameras or even more are needed for this effect (depending on how many angles the display target audience's display requires). Consequently, the benefits of this system are greatly enhanced in the virtual world. But even with the high camera requirements, this is currently by far the most advantageous method for creating 3D.

Spread the breadth of depth

3D monitors that don't require those pig ugly 3D glasses or head tracking devices are known as autostereoscopic. In order to eliminate the need for these ugly devices, a separate image must be directed at each eye. This is done via otherwise standard modified LCD/TFT displays. But how the heck do you get a plain flat screen to display multiple images at the same time and have each one directed at a separate eye, without reaching the other?

Well, autostereoscopic displays work extremely well when used in conjunction with X3D's rather nifty screen technology called 'Wavelength-selective Filter Array'. This means that the screen's pixels output an array of all the different views in a square-shaped pattern (basically one large virtual pixel made up of many physical pixels), which is then repeated right across the entire display. On the front of this is an attached filter array sheet that redirects these arrayed virtual pixels behind it in a way so that only a total of two of the multiple views are ever seen from particular viewing angle, and only by the appropriate eye. So for each and every 'pixel' you can actually see, depending on the angle view count, there is an array of real pixels behind, shooting out all available angles, also known as channels. Generally speaking, the current standard count for multi-channel display systems is around eight in order to provide a decent range of views.

Doing this, of course, dramatically cuts down the end output resolution, because if you have, for example, eight horizontal viewing angles, you are essentially only getting one-eighth of the possible resolution. This is why the higher the resolution TFT, the greater the advantages – but there aren't a huge lot of these available at anywhere near affordable prices. So for the time being, rather low resolutions must be put up with.

Behind the Barrier

The Barrier 3D technique works similarly to the Wavelength technique, only instead of multiple angular views it generally only accepts two sources of angles and works by blocking the opposite view from the other eye. This way a stereo pair is produced via blocking unwanted angles. The only problem that exists with this technique is that it tends to darken the screen quite a bit because dark vertical lines cover 50 percent of the screen, with each eye capable of seeing half of the LCD/TFT pixels. On a good majority of these displays there is usually a small indicator that shows the safe spots – usually a small LED that you can't see unless you're in a 'viewing capable zone'.

Sharp has just released the world's first 3D laptop, and it is actually based around the Barrier design. The great thing about this particular notebook is its ability to finally switch the 3D effect off, because, just like the Wavelength monitor, it's impossible to see a normal 2D desktop with it on. We hope to have a good look at one in a coming issue.

With the filter also comes the need to have precise positions for every actual individual pixel, this is why instead of CRTs, only TFT or Plasma screens can be given the ability to do this, as they have a set physical position for each pixel.

As the Wavelength-selective Filter Array method is passive, there are no moving parts – instantly cancelling out the need for head tracking, 3D glasses, or any other additional devices. The other benefit is that this technology can be implemented into any existing TFT monitor. Newer ones about to hit the market will also have the ability to turn off the 3D setting. These just might be the babies worth waiting for, as no commonly known version of Windows/Linux/MAC/your favourite OS have been implemented with native support for a true 3D GUI as of yet. The desktop really just doesn't look any good when set to 3D.

Dead cheap

As mentioned a couple of issues back in Short Circuits, in a lab room at the University of Toronto, a smart lab rat discovered that it's possible to create a 3D monitor from cheap sheets of high linearly polarised material and a laptop monitor (a horizontally polarised screen), but it must be cellophane manufactured in a particular way with a thickness of 25 microns. With a major lack of cello' experts around, we just stashed up on the stuff with much hope of success. Well, we had absolutely no degree of luck at all. In theory, it should work, as it's the manufacturing process that gives them polarizing properties, but this is half the problem. It would seem most aren't manufactured this way. Apart from the new addition at *Atomic* HQ – the Reservoir of Cello' – unfortunately theory is all we can stand on just now. The instant we find a cheap linearly polarised material that actually works (other than an expensive half-waveplate), we'll either run amok and paste cello' on all of Sydney's TFT screens, or let you know.

The ability to simply walk around in front of the display and see a different perspective of the current scene is quite incredible. However, whilst doing so you'll be hitting small dead zones or 'transitional areas'. These areas are the zones in which you see the effect of 'pseudoscopic parallax'. This is a natty way of saying you'll see a garbled mess with parts of the image reversed and overall, pretty screwy. But this can be fixed, and to do so you simply move a tad to the left or right and all returns to glorious 3D. These areas can't be fully escaped, only increasingly avoided by inserting more and more viewing angles. At the moment, with eight viewing angles pretty much the standard, the only other option is to spill some more moolah on other larger, more expensive Plasma screens which sport twenty or more zones. The further you stand away from these, obviously, the larger both zones will be, which is one of the reasons the larger ones (we're talking 69 glorious inches of display here) are used for public display and usually have the highest count of viewing angles.

Rather than the cross-eyed method (*see 'Crossing the eye'*), which does work extremely well, we'd prefer to gaze at a screen without the need to look like crazed maniacs while eagerly awaiting the 'painful eyes' fatigue. Obviously the only way to trick our eyes into believing there is a true 3D world in front of them is to have two separate images sent to each eye, one slightly more offset than the other.

It's hard to properly imagine this effect without actually seeing it. Pick up an object and look at it with only one eye opened without moving. That's a good representation of what we currently see on today's screens. It's a 3D object in a 3D space, sure, but as there's only one angle of it currently being displayed in one eye it's moreor less 2D.

The information input into the actual display itself must also be 3D in nature. In order for this to happen, several views must be captured. For video, a minimum of two cameras are required to be at slightly offset horizontal angles to each other. This will certainly pose a problem for pushing 3D to the TV market, but certainly not computers. Living in the virtual world, computers – as you'd expect – need only create virtual cameras. These will always be more precise than the real world, and a heck-load less strenuous to set up. The primary concern is the increased need for much more powerful hardware, as capturing eight or more times camera angles really stresses the system.

> . . . for each and every 'pixel' you can actually see, depending on the angle view count, there is an array of pixels behind, shooting out at all visible angles, also known as channels. . .

RIGHT: This unusual looking camera is what is used to take photos for the almighty View Master. The two highly adjustable lenses take two photos, each offset at a slightly different angle to the other. These two photos are then implemented onto the circular reels of joy and, if shot properly, create a great perception of depth.

Loud spectacle

Volumetric displays are yet another special technique to produce 3D imagery, but the imagery really does have depth. They create fully 360° viewable 3D objects. The folks over at Actuality Systems have been working on these for many years and are finally creating some darn neat displays that actually work. They are, however, limited in what they can display, as the images are created via a fast spinning plane, or projector screen, which relay-optics direct light onto at a current refresh rate of 24Hz. The awesome thing here is that all depth cues can be simulated in volumetric displays, as it is 'physically' there, in a way. Volumetric displays are the future, but there's quite a way to go before they become 'commercially viable'. Check out the funky displays and in depth white papers on how volumetric displays work, here: **www.actuality-systems.com.**

Drive me deeper

Of course, with such a huge change in design, drivers need to be written for these monitors to understand the information they are given – which is the reason why most 3D displays can only understand DirectX 7 code for games. Thus killing off much of the reason to get one for gaming, yet. Unless, of course, you are totally addicted to the Blood 2 mission pack, as we all are.

In order for this to work, each API to be used (DirectX, OpenGL, etc) needs a driver to support this feature – a simple matter of a patch update. This way it can capture the scene with the desired camera positions. Once these 2D shots are captured, it's a matter of rendering all of these and displaying the end result on the 3D screen.

The problem, as we've mentioned, is the hardware requirements for such a dramatic increase in need for processing power/memory. Steps are taken to avoid this, but the performance would be a lot less than that of a single camera scene. That's the price we pay for pretty graphics – slower performance. But where's the care factor when we're talking about 3D screens?

Plastic holograph

A great example of another early '3D display' is those wonderful lenticular image sheets we all love to play with (well, as kids of course). In use since the 1930s, lenticular images are those transparent plastic sheets engraved with parallel lenses with interlaced images behind them. You know how when you change the angle of the sheet the pictures change according to the angled lens you are viewing each interlaced image through? Yeah, those. This is a form of motion parallax and some 3D monitors actually work this way. They're easy to manufacture and have a high brightness. But because the pixels are greatly enlarged (not a good thing), they have a highly reflective surface and it ends up being rather expensive to implement a switching method between 3D and 2D modes, so it isn't the best technique.

DirectX 8 support is just around the corner, so you will soon be able to drop that *bloody* game, plus it will be interesting to see how this performs with today's DX8 games – particularly the high end games.

Look up

3D monitors are the future; they just need fine-tuning, better driver support and a healthy price drop. It's not a matter of if, but when we are all using one. So, when we're all using them, we'll look back at these times in the same way we currently view the older original graphics – you know, those lovely 2D ASCII characters that required manuals to tell what they actually were. Oh, but they were so very realistic back then. . .

It looks likely that the computer market will see properly functioning 3D screens far sooner than TVs because of the rather complex need for eight or even more specially placed video cameras. Of course such cameras in the digital world are easy to set up – it's just that the computer requirements instantly sky rocket.

Short of Fakespace System's US$500,000 fully immersive CAVE system, or your very own IMAX theatre, 3D monitors aren't an overhaul of existing display technology; but this is certainly a big step in the right direction. Forget displacement maps, pixel shading and anisotropic filtering. Yeah, screw them all! We want to see large 69in 3D plasma monitors in our bedrooms. With far better driver support due to hit town in the not-too-distant future, from our perspective, it's time to display some deep excitement.

Can we dissect it now?

Thanks to VR21 Pty Ltd (the sole Australian reseller for X3D displays) for providing their beautiful 3D 15in monitor (4D-15™ A1) to test with.
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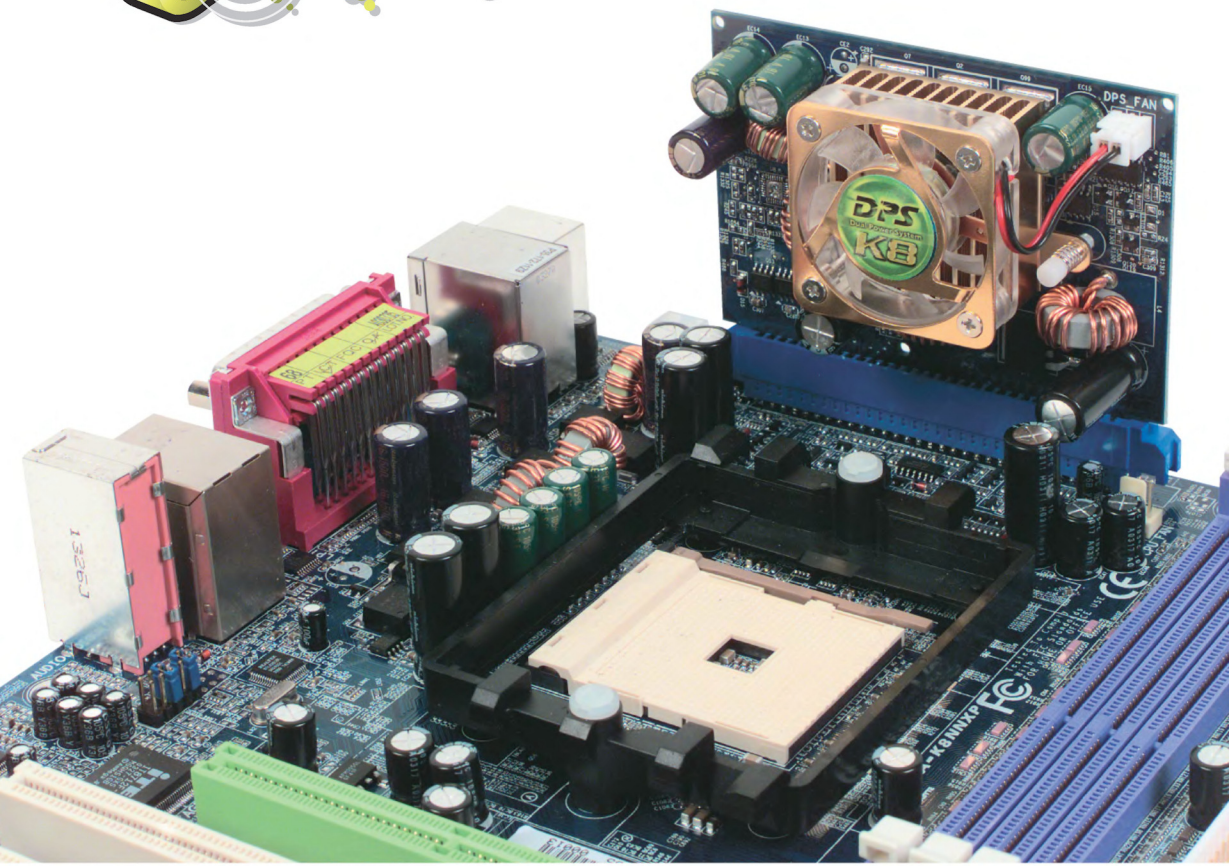


Bad-assed mobos

John Gillooly gets down in the hood with nine of the whackest Athlon 64 mobos.

Normally there is a lag between the launch of a new CPU and the emergence of a range of chipsets. But thanks to the Athlon 64 launch date's numerous delays, things are different. NVIDIA, SiS and VIA had chipsets ready to go, and because of that there are no consumer motherboards using AMD's home brand chipset.

Only a handful of manufacturers are making use of SiS's 755 chipset for their Athlon 64 offerings – instead the majority of them have a range of boards based around NVIDIA's nForce3 and VIA's K8T800 chipsets. This month we have gathered together the premium Socket 754 boards from nine manufacturers, of which two use nForce3 and seven use the K8T800.

So begins the next flipflop of dominance of the Athlon chipset market. It used to be that in Athlon roundups we would see mainly VIA-based boards with occasional offerings from NVIDIA and SiS. And then nForce2 was launched, breaking VIA's dominance and relegating its chipsets to the budget category. We now know why this happened – it was largely due to VIA putting all its efforts into the K8T800, and then suffering from AMD's rolling launch delays.

Motherboards for the Athlon 64 are quite different to what we have become accustomed to. Because the CPU has its memory controller built-in, the Northbridge has now turned into a glorified AGP controller. Gone, for now, are the days of the real difference between chipsets lying in the ingenuity of the team responsible for designing the memory controller; at the moment we see an almost total focus on Southbridge features.

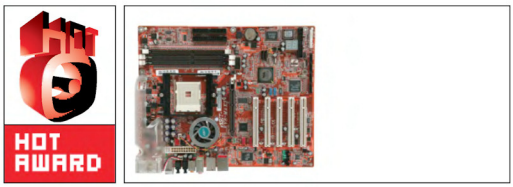
NVIDIA has even gone so far as to reduce the nForce3 to a single chip, a strategy used in the past by SiS. VIA still uses two chips in the classic Northbridge/Southbridge configuration.

With nine of the best Athlon 64 motherboards available sitting in the labs we then disappeared for a few weeks to do some testing. As we suspected, the inclusion of the memory controller on the Athlon 64 CPU leads to minimal performance differences between motherboards. We tested each board extensively, using Unreal Tournament 2003, SYSmark2002, 3DMark2001SE, 3DMark03 CPU test, Aquamark 3 and SPEC

Viewperf 7.1, and the biggest performance difference between the fastest and slowest board was 8 percent in SYSmark. Most of the boards were testing within 1 or 2 percent of each other.

We have published some of the results so that you can see the spread, but you will notice that, unlike the usual result plots from these roundups, there is no one board that dominates the scores. With this remarkably flat performance spread, the focus of our evaluation has been on features, and there are some remarkably fine examples of featured-up motherboards in the Athlon 64 range.

We have chosen two Hot Award winners, one based upon the choice and selection of features, and the other the best balance between features and cost. You will notice that we have not published prices for these boards. This is a decision we reached based on the rapid flux of prices and also because a lot of products are currently only available bundled with CPUs, thanks to the low number of Athlon 64s being shipped by AMD.



ABIT KV8-MAX3

Chipset: VIA K8T800
Specifications: 6 SATA ports; 2 parallel ATA ports; Gigabit Ethernet; IEEE1394a; 6 channel audio; µGuru hardware monitoring; externally vented cooling.
Website: ABIT www.abit.com.tw
Distributor: Altech www.altech.com.au

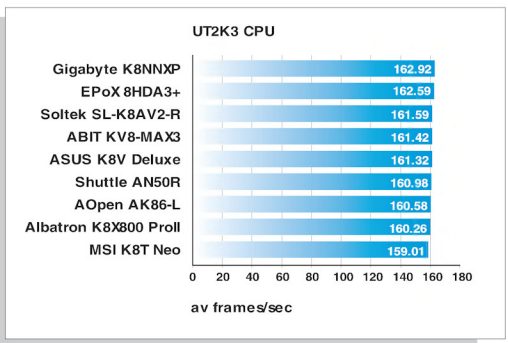
ABIT is now into the third generation of its legacy free MAX motherboards, and the K8V-MAX3 is the most feature laden so far.

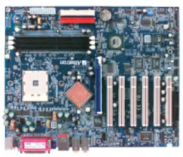
The board lacks serial and parallel ports, but in their place are some innovations seen nowhere else. To complement the externally vented OTES cooling used to keep power circuitry chilled, ABIT has added its new µGuru chip for comprehensive hardware monitoring.

The first MAX boards had so many features that ABIT could only fit a handful of PCI slots onto them, but the K8V-MAX3 shows this is a thing of the past with a full complement of five PCI slots.

One of the bravest moves made with this board is the six SATA ports. We heartily recommend choosing Serial ATA if you are shopping for a drive, and this large number of ports means huge expandability.

ABIT's K8V-MAX3 is not going to be ideal for everyone, but it provides the most comprehensive, up-to-date feature set of any of the boards in the roundup. This really is the cream of the feature crop.





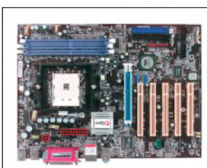
Albatron K8X800 Pro II

Chipset: VIA K8T800
Specifications: 2 SATA ports; 2 parallel ATA ports; Gigabit Ethernet; IEEE1394A; 8 channel audio.
Website: Albatron www.albatron.com.tw
Distributor: Australia IT www.australiait.com.au

Albatron's K8X800 Pro II is a pretty basic offering for the Athlon 64. It has limited features compared to other brands, but still provides enough functionality for the average user.

We were somewhat disappointed that the motherboard only had the hard drive connections that are supported natively by VIA's chipset, rather than some sort of secondary RAID controller. If you are running a parallel ATA setup then this is OK, but because Serial ATA abandons the traditional Master/Slave relationship the board will only support two SATA drives.

This is a decent quality board for the Athlon 64; however it falls behind the competition in the feature stakes.



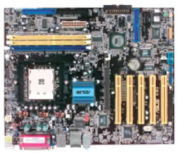
AOpen AK86-L

Chipset: VIA K8T800
Specifications: 2 SATA ports; 2 parallel ATA ports; Gigabit Ethernet; 6 channel audio; 5 PCI slots; 3 DIMM slots.
Website: AOpen www.aopen.com
Distributor: Blue Chip IT www.bluechipit.com

AOpen's AK86-L is a bit different to the other boards. While it is light on the onboard features – with only two SATA, two parallel ATA ports and no IEEE1394A – it is loaded with AOpen's special BIOS based enhancements.

These range from generic technologies like automatic CMOS resetting after failed overclocking, to more specific technology like AOpen Jukebox Player, which allows you to play CDs and MP3s without needing to boot into Windows. Also featured is Vivid BIOS, which allows you to add colour images to the POST screen without resorting to BIOS hacking.

While the AK86-L is a decent board, the feature-rich BIOS ends up being let down by the tiny number of features on the board itself.

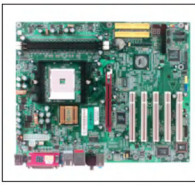


ASUS K8V Deluxe Wireless Edition

Chipset: VIA K8T800
Specifications: 4 SATA ports; 3 parallel ATA ports; Gigabit Ethernet; 802.11b Wi-Fi; IEEE1394a; 5 PCI slots; 3 DIMM slots.
Website: ASUS www.asus.com.au
Distributor: ASUS www.asus.com.au

ASUS's K8V Deluxe Wireless Edition is all about the features. While it performs well, it rivals the ABIT KV8-MAX3 for sheer number of add-ons. Unlike the performance focus of ABIT's offering, the ASUS K8V has a much more widespread focus, with an 802.11b wireless LAN card included with this edition of the board.

The end result is impressive, although we would have preferred seeing an 802.11g adaptor rather than the older 802.11b standard. This is a very well rounded motherboard, covering all the base functions that anyone would want while not diverging too much from conventional motherboard design.



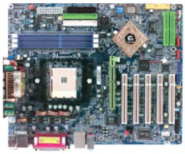
EPoX 8HDA3+

Chipset: VIA K8T800
Specifications: 6 SATA ports; 2 parallel ATA ports; Gigabit Ethernet; 10/100 Ethernet; 6 channel audio; 5 PCI slots; 2 DIMM slots
Website: EPoX www.epox.com
Distributor: Westan www.westan.com.au

Even though EPoX's 8HDA3+ is not one of the feature focused motherboards in our roundup, it has all the right technologies where it counts. Six SATA ports make for a very comfortable amount of future drive expandability, while the inclusion of both Gigabit and 10/100 Ethernet is damn handy.

The board only has two DIMM slots, which we would normally frown upon. But with the Athlon 64 there is a good reason for this choice. The memory controller of the Athlon 64 can drive three DIMMs of DDR266 or DDR333 but only two DIMMS of DDR400. This is an enthusiast board, so it is reasonable for EPoX to assume that end users will predominantly want to run DDR400.

Overall the 8HDA3+ is a simple board that packs extra features where it counts. If you are looking for a simple Athlon 64 board with great future expandability, this is an almost perfect choice.



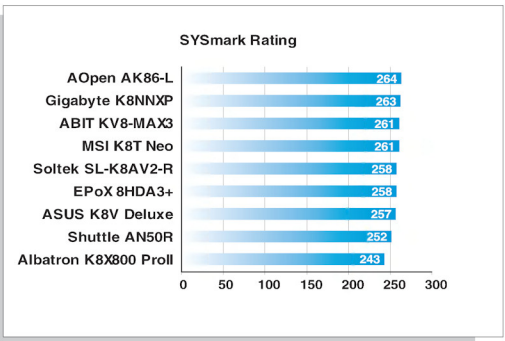
Gigabyte K8NNXP

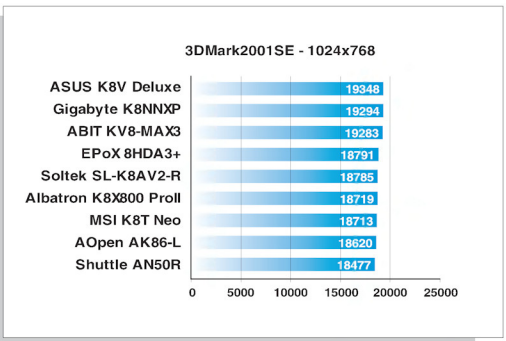
Chipset: NVIDIA nForce3
Specifications: 2 SATA ports; 4 parallel ATA ports; Gigabit Ethernet; 10/100 Ethernet; 6 channel audio; IEEE1394; 5 PCI slots; 3 DIMM slots
Website: Gigabyte www.gigabyte.com.tw
Distributor: Synnex www.synnex.com.au

The K8NNXP is part of Gigabyte's deluxe range of 'Six dual miracle' motherboards. This means that it features such extras as dual BIOS, dual LAN and Gigabyte's Dual power add-on board for smoother power delivery.

It is one of the few boards in the roundup that use NVIDIA's nForce3 chipset, which lacks the features of VIA's K8T800 and NVIDIA's upcoming nForce3 250 GbE chipset.

However Gigabyte has taken it upon itself to crank up the features supported by the board. It is laden with extras; however these don't quite match up with the feature list of the ABIT KV8-MAX3 board.





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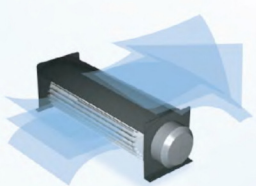
CROSSFLOW BLOWER



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- Dimension: 210 x 148.5 x 42.5 mm
- Weight: 750 g
- Rated Voltage: 12 V
- Rated Current: 0.1 A
- Fan Speed: 2000 ~ 3700 RPM
- Airflow: 16 ~ 30 CFM
- Noise Level: 28 ~ 38 dBA
- Fan MTBF: 30,000 hrs
- Bearing Type: Ball Bearing

Air Flow Diagram:

Model:

VTX-C01-BK (Black)

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Website: MSI www.msicomputer.com.au
Distributor: MSI www.msicomputer.com.au

MSI's foray into the world of Athlon 64 is a board with a solid, if unspectacular set of features. The backplane is particularly well designed, with all the analog and digital audio outputs you will need for 5.1 surround without needing to plug in an expansion plate. Also on the backplane are both major types of IEEE1394 connection, as opposed to the standard connector used on most boards. And it features MSI's CoreCell chip, which is used for hardware monitoring.

With four SATA ports and three parallel ATA ports the K8T Neo has ample room for both existing drives and future additions to storage. It may not stand out in any single aspect but the K8T Neo is a beautifully rounded motherboard solution.

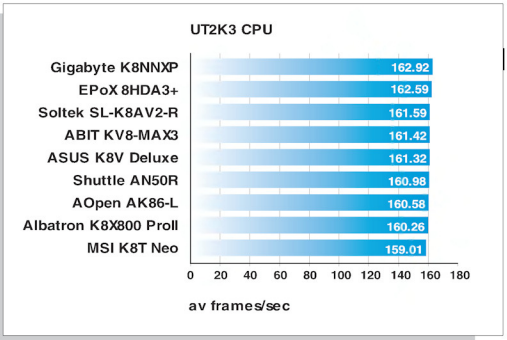
Shuttle AN50R

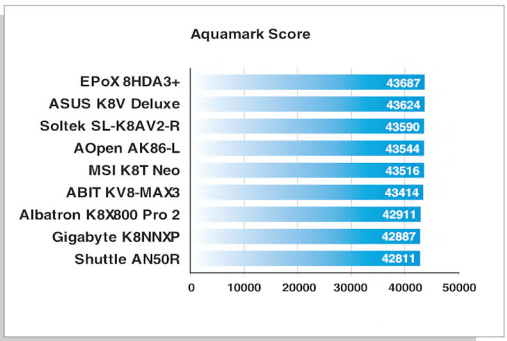
Chipset: NVIDIA nForce3
Specifications: 2 SATA ports; 2 parallel ATA ports; Gigabit Ethernet; 10/100 Ethernet; 6 channel audio; IEEE1394; 5 PCI slots; 3 DIMM slots
Website: Shuttle www.shuttle.com
Distributor: Sato www.satotech.com.au

Like all the other boards tested, Shuttle's AN50R offering is a competent performer.
Unfortunately it falls behind the other boards with its simple set of features. This is not to say that the AN50R can be found lacking in any areas other than the restrictive number of ATA connectors, it is just that most of the other boards have a more comprehensive feature set.

Thanks to the inherent qualities of the nForce3, Shuttle has managed to add dual Ethernet to the AN50R, but this still does not drag it ahead of the competitors.

The AN50R is a good motherboard, it just fails to stand out.





Soltek SL-K8AV2-RL

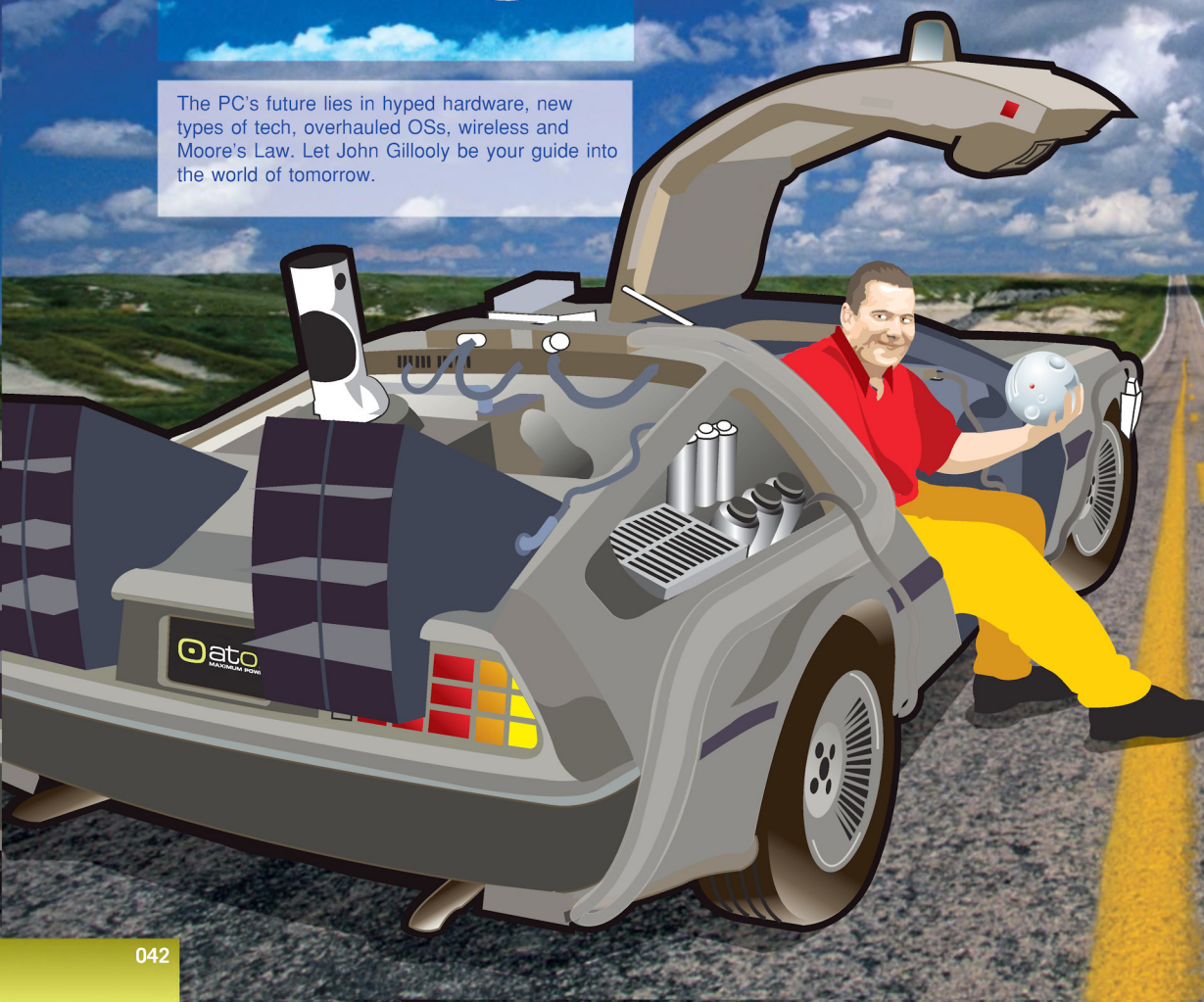
Chipset: VIA K8T800
Specifications: 2 SATA ports; 2 parallel ATA ports; 10/100 Ethernet; 6 channel audio; 5 PCI slots; 2 DIMM slots3
Website: Soltek www.soltek.com.tw
Distributor: Altech www.altech.com.au

The most basic board in the roundup, Soltek's SL-K8AV2-RL has a minimal feature set. While it has everything you need to build a basic system, it has restricted expandability and lacks added extras like IEEE1394 and Gigabit Ethernet as seen on other motherboards. While these are not essentials at the moment, IEEE1394 is commonplace enough to want it onboard, and we expect to see the importance of gigabit Ethernet rise over the next year as more people start taking advantage of this bandwidth bonanza.

If you are after features then this is not the best board out there, but if all you want is a basic foundation upon which to build your system, it's a decent choice.

Refining the PC

The PC's future lies in hyped hardware, new types of tech, overhauled OSs, wireless and Moore's Law. Let John Gillooly be your guide into the world of tomorrow.



Eighteen months is a long time in the PC industry. Not only is it the timeframe for 3D Realms to announce the next Duke Nukem Forever delay, it is the base unit of the Silicon Valley calendar; the scale of a little idea called Moore's Law.

It's amazing how one man's guesstimate can drive an industry, but the closest thing the semiconductor industry has to prophesy is Moore's Law – the notion that the number of transistors on a chip doubles every 18 months. What most people don't realise is that Gordon Moore's initial observation was based upon observed trends rather than any scientific shenanigans.

But the shift in the past few years of CPU development has been away from pure performance. This means the traditional extrapolation of Moore's Law to a doubling of performance every 18 months no longer holds true. In other areas of the industry, like 3D chip design, manufacturers have been moving at a much faster rate for several years now.

But as the industry has focused on faster chip performance, the rest of the PC has been left behind, riddled with legacy hardware that holds the system back from achieving the harmonious performance needed to get modern hardware running as it should. The modern PC is a mishmash of bottlenecked bandwidth and inefficient design, and over the next few years there are numerous ways in which legacy hardware is set to disappear, while more efficient versions of technology are just around the corner.

The revamp of the PC has already begun, both in terms of new industry-wide standards like Serial ATA and HyperTransport and in the manufacturer driven popularity of smaller form-factor PCs.

But change is occurring on every level of the PC, and for the most part, this will help our systems to run smoother and faster.

Microsoft at the reins

Windows has now become intrinsically linked with the home PC. Like it or not, it is Microsoft who has ultimately driven the direction of hardware development over the past 10 years, and it will continue to have such a role into the future.

Even though we are yet to see it in Australia, Microsoft has just rolled out the second version of Windows XP Media Center Edition. This is an OEM-only version of Windows XP designed for digital media consumption. The reason that it only comes with pre-built systems is that Microsoft has strict guidelines for system design in order to simplify the average user's experience.

Media Center Edition allows people to use their television to view digital media, with an easily viewable interface that is designed for navigation through a remote control. It also contains the software needed to use your PC to automatically record television shows as well as watch DVDs and videos, listen to MP3s or watch slideshows of family photos. It's all very modern-American-dream, and already do-able for those with some tech savvy, but it has become a cornerstone of the development directions being taken by companies like Intel, AMD and NVIDIA.

But Media Center is only one part of the operating system puzzle. The big daddy of upcoming OSs is Microsoft's much anticipated Longhorn. Due sometime in 2005, Longhorn is a complete revamp of Windows from the kernel to the GUI, and will come with chunky system requirements and native support for a lot of the new hardware features that are due to appear in the next few years.

Longhorn's impact is already being felt. The new GUI, codenamed Aero, brings 3D to the desktop in a big way. At this early stage it looks like there will be a minimum requirement of at least DirectX 7.0 level video hardware with 64MB of RAM, with DirectX 9.0 level hardware needed for the most fandangled level of graphics goodness. This is the main reason why both NVIDIA and ATI are pushing for widespread DirectX 9.0 support in their product range and, like Windows XP, the industry is already salivating at the prospect of mass upgrades when Longhorn finally hits.

What the introduction of Longhorn brings to the market is an opportunity to revamp, and not just through minor speed or bandwidth upgrades. This is finally a chance to fix a lot of the fundamental components that have lingered since the birth of the PC, which means change is in the air for everything from the BIOS to the way we connect peripherals.

Making the switch

Some of the most fundamental and desperately needed changes to the PC are happening on the motherboard. Sometime in the first half of next year, chipset makers will start releasing chipsets with support for PCI-Express, the long awaited replacement for the PCI bus. PCI-Express drastically improves available bandwidth, and, thanks to the use of a switching architecture, it eliminates the problems of noise and interference that have flooded the PCI bus for many years now.

PCI-Express will initially appear in two forms. The base PCI-Express architecture is scaleable, so more bandwidth-hungry technologies like 3D graphics will be able to upsize the connector to receive more bandwidth. In fact, the first widespread implementation will be as an AGP replacement, as ATI and NVIDIA both look to x16 PCI-Express as the solution to the restrictive bandwidth of AGP.

Most PCI-Express chipsets will also include a x1 PCI-Express connection for Gigabit Ethernet (GbE). Until now GbE has been an unsuccessful technology on the desktop, which has been mainly due to it being severely choked on the PCI bus. This has been the reason for Intel introducing its dedicated CSA link in the 875P and 865 series chipsets; once you take the GbE controller off the PCI bus you can get almost 2Gb throughput out of the controller.

Over time, more and more add-in cards will move onto x1 connectors on the PCI-Express bus, but expect to see legacy PCI slots hanging around for some time

yet. When *Atomic* recently asked a group of top PCI-Express architects about the future for PCI they drew an analogy with the phase out of ISA slots on the motherboard: 'The perfect transition is that it [PCI] will go away and you won't notice.' So expect to see PCI slots lingering on mobos for a few more years.

PCI-Express support in chipsets will be introduced alongside the new DDR2 memory standard. This will initially be used for high-end systems, and will slowly filter into the mainstream. Unlike the radical change that occurred during the shift from SDRAM to DDR, the move to DDR2 involves refinement of power usage and signalling in order to facilitate both higher memory speeds and DIMM sizes. DDR2 will initially run on an effective 533MHz bus, with plans for speed ramps to 667MHz and 800MHz over the next few years.

DDR2 will also dramatically increase the effectiveness of large DIMMs, which will become increasingly important as memory sizes rise towards the 4GB barrier imposed by 32-bit computing. According to Moore's law-driven predictions, most in the industry expect this need to arise sometime towards the end of 2007, even though AMD are already in the market with 64-bit desktop processors.

Core concerns

Athlon 64 has already launched, and this new architecture will form the basis for AMD's strategies for the foreseeable future. Don't expect to see too many changes in the next year or so, with AMD saying its only short term plans are a shift to 90 nanometre cores codenamed 'San Diego' for the Athlon 64 and 'Athens' for the Opteron/Athlon 64 FX. Architecturally there are no major shifts planned, although the company says we can reasonably expect that support for DDR2 will be built into the CPU's memory controller at some point.

AMD's weapon of choice for the future is certainly 64-bit computing, but it is only one solution to the perceived future needs. The primary benefit of 64-bit computing is to solve the impending 4GB system memory restriction, the rest of the benefits of the AMD64 architecture are down to the inbuilt memory controller, larger L2 cache and architectural improvements rather than any raw 64-bit computing magic.

Intel is approaching the future with a reduced focus on pure clock speed. Instead it has adopted a 'value-add' approach to dealing with the increasing transistor budgets made possible by finer resolution process technology. Its updated Prescott core for the Pentium 4 is due to appear sometime before the end of this year and it will be the first production CPU to use Intel's new 90 nanometre strained silicon process technology. It will bring with it improved branch prediction, improved HyperThreading support, increased cache size and 13 new SIMD instructions, dubbed PNI (Prescott New Instructions).

After Prescott will come Tejas, which will probably be dubbed 'Pentium 5' when it's released – later next year according to Intel. It will come in a new 775 pin LGA package and is rumoured to run on a 1066MHz front side bus (paired with dual channel 533MHz DDR2) and feature a further eight new SIMD instructions. While Intel promise Prescott will initially be compatible with existing chipsets and sockets, the shift to Tejas will mean upgrading your motherboard and most likely your memory as well.

Up in the air

These technologies are all imminent; however there are also some new things still in the planning stage that will complete the updating of PC internals. Just like Serial ATA left the drive mechanics alone and focused on fixing the cabling, ultra wideband (UWB) has popped its head up and promised to not only fix the tangle of peripheral cabling but possibly remove the cables altogether.

Wireless keyboards and mice are nothing new, but each setup needs a proprietary receiver in order to work. Similarly Bluetooth is now becoming common thanks to mobile phones, but it is power hungry, clunky and counterintuitive to use, and has not been adopted as a general peripheral connection technology. UWB technology has been around for some time, mainly in military use, and was finally approved for commercial use by the almighty US Federal Communications Commission (FCC) in February 2002.

An official ultra wideband specification was the subject of rival proposals from various companies, but earlier this year the leading proposals from Texas Instruments and Intel were merged into a single standard that is the current leader in the race to become certified by the IEEE and achieve the official 802.15.3a designation. The strongest rival proposal comes from XtremeSpectrum and Motorola, and the final decision is expected to be made during an IEEE meeting in November.

Based around a low power design, UWB spreads its signal over a broad chunk of the radio spectrum (from 0.5-7GHz). Doing this enables the theoretical 100Mb/s or greater data transfer speeds over a distance of 10 metres, which is useless for wireless LAN but perfect for connecting peripheral devices.

Rather than come up with a new 'super interface' to replace USB, FireWire and Bluetooth, the end use for 802.15.3a will be as a physical layer over which new wireless versions of IEEE1394 and USB will operate, as well as Bluetooth and other future connection technologies.

In the LAN space the near future is set to be split between Gigabit Ethernet and 802.11g Wi-Fi. With PCI-Express finally providing enough bandwidth to make GbE viable, it is likely to take over from the long established 100Mb/s Ethernet that has become the default standard for home networks.

However there are some big advances that will make Wi-Fi a more viable proposition for home users than before. The first will be the slow migration towards pure 802.11g networks rather than the current mix of devices connecting to 802.11g access points. While the newer 802.11g standard is backwards compatible and supports high data transfer rates, the quality of access is diminished when 802.11b devices are connected to an access point. Two new Wi-Fi technologies are on the cards, the first is based around isochronous data transfer and is being developed under the moniker of 802.11e, which enables Quality of Service features for reliable wireless streaming of video, voice and audio. The second is called 802.11i and it aims to move beyond the WEP encryption scheme that is currently used in one of two new options — Temporary Key Integrity Protocol (TKIP) or Advanced Encryption Standard (AES). Of all the new standards, only AES enabled networks will need hardware upgrades.

After legitimising Wi-Fi with its Centrino initiative, Intel is doing some funky research into improving wireless efficiency. Perhaps the most promising of what has been displayed so far is a technology called MiMo (Multiple input, Multiple output), which employs multiple antennas to reduce the problems caused by scattering of radio waves. Each antenna tags its part of the signal, which is then reread at the other antenna. In the public demonstrations this has shown a vast improvement in speed

Vanilla Ice, once famous for his hit *Ice Ice Baby* and appearance in *Teenage Mutant Ninja Turtles*, now rides motorbikes and owns a clothing store in Florida.

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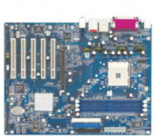

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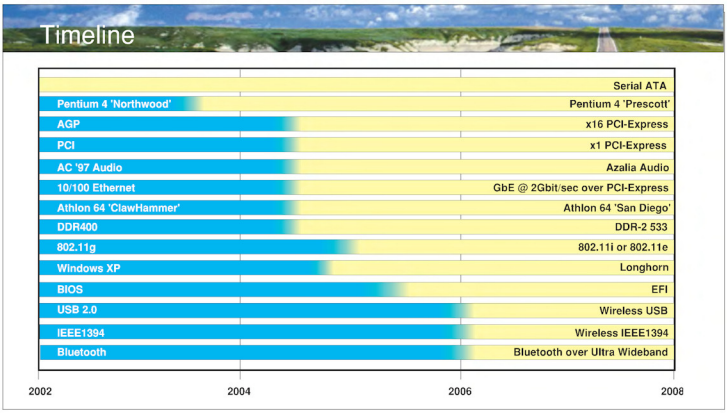

LEFT: The schedule for change over the next five years. The colour change on the timeline indicates the scheduled time for technology to come online. These are rough estimates of timing based upon predictions and product schedules from various sources.

and connection reliability and is perhaps the most imminent Wi-Fi improvement on the horizon.

On a broader scale there is a lot of work being done currently on 802.16, or WiMAX, which is designed as a medium-range wireless broadband technology for fixed locations. This allows for users over a 30 square mile radius to attain broadband Internet speed from their home but, unlike Wi-Fi, it is currently designed to communicate with a fixed antenna (there is a roaming update being worked on). After the amazing work done setting up ad hoc Wi-Fi networks over metropolitan areas, the introduction of 802.16 has the potential to create a new grassroots wireless revolution, as long as the hardware isn't priced squarely in the realm of the telco.

ABOVE: ATI's first PCI-Express video card with a 16x connector – no need for external powering.

The framework of the future

One of the cornerstones of future PC development is the notion of the PC as an open platform. Big tech companies have learnt from past mistakes and the major new tech is coming in the form of open standards. But the other key to the new technology is modularity. We see it with the scaleable bandwidth of PCI-Express, the software design of Longhorn and the plans for ultra wideband.

But the most important move in modular design is called EFI (Extensible Firmware Interface). This unassumingly named technology is designed to replace the BIOS with a C++ based firmware architecture. It is a hard technology to explain, because it will not truly hit its stride until EFI aware OSs are available. In a nutshell it is a completely new low level operating system for the PC, one that smashes the restrictions imposed by the BIOS and provides the best chance yet that the 3.25in floppy drive will die the painful death it so rightly deserves.

EFI brings the driver concept to the PC's firmware, which allows for more flexibility when adding new hardware to the system while also allowing developers to build low level hardware drivers that are compatible with any EFI based platform. It does this by breaking up the firmware into two segments.

When you boot an EFI based PC it enters a state known as Pre-EFI Initialisation (PEI), in which the essentials of memory allocation and hardware initialisation occur. Once this phase completes, the system moves into the Driver eXecution Environment (DXE), where the rest of the system's hardware is assigned memory spaces and dependencies between products are worked out. The drivers used in this environment are not the same as operating system drivers, rather they contain just enough code to assign memory, run basic functions and change settings. Once everything is set up system control is passed to the boot loader and then the EFI aware operating system.

Within this framework only the PEI code needs to be rewritten for new platforms. All the code used in the DXE is designed to work on everything from the smallest mobile phone CPU to eight way Itanium clusters. By creating such a modular design manufacturers need only code one lot of drivers.

It is during the DXE stage that the firmware can be controlled. Thankfully EFI is network aware, so unlike BIOS updating, new drivers can be grabbed from a networked PC or the Internet if you do not have the file stored locally. Configuring device settings is also highly improved as the C++ interface allows for things like step by step troubleshooting.

Once the system has completed its DXE tasks it passes control of the system over to the boot loader and then the operating system. In the interim period before EFI aware consumer operating systems like Longhorn are available, a further component is involved to ensure compatibility. This is called the Compatibility Support Module (CSM) and provides a means for the drivers to interact with legacy BIOS runtime code on boot.

Shake the foundations

Once these technologies come online the PC experience will change in subtle but significant ways. Perhaps the most important aspect of the change will be the final abandoning of the unintentional bottlenecks that have cropped up with the haphazard approach to technology upgrades that have plagued the short history of the PC.

In a general sense the industry has reached a watershed; there is now strong realisation that the technology being introduced now will exist for a long time. In the past there has been little actual foresight into the potential lifespan of technology being developed, and it is only now that PC tech is being researched with a focus on future scalability.

While the various wireless solutions are likely to change a bit due to the youth of the technology, I/O solutions like Serial ATA and PCI-Express have been designed to scale over the next 10 years, at which point predictions are that moving to

Although Anubis is recognised as the Egyptian god of the dead, Osiris actually became more popular and usurped that position.

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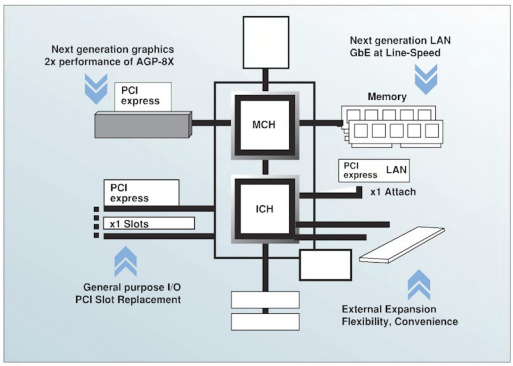
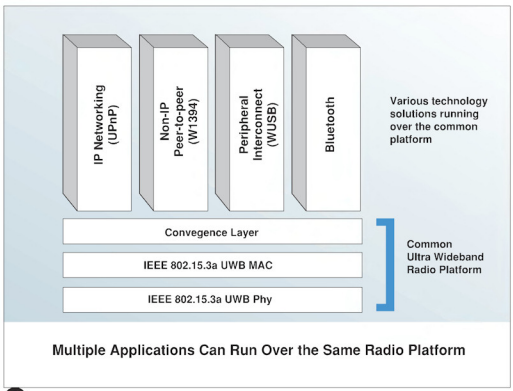


ABOVE: Schematics of a PCI-Express equipped chipset.



ABOVE: Ultra Wideband is designed so that it can run multiple protocols.

optical interconnects will be financially viable. The more open EFI was designed with a 20 year lifespan in mind.

Because of the rate of innovation seen in the PC space there is little long term information about where the PC is moving. But there have already been some exciting morsels released about what will happen as the biannual move to smaller semiconductor manufacturing processes enables more and more transistors to be squeezed onto CPU dies. While AMD is currently keeping its future technology directions somewhat guarded (especially after the lessons learned by the long hype phase for the Athlon 64), Intel regularly provides glimpses at future directions through its Intel Developer Forums.

One of the most exciting long term strategies that was recently outlined at an IDF was the logical evolution of HyperThreading. Though still years away, Intel has plans to move towards embedding two CPU cores on single die. Like HyperThreading it will be Intel's server CPUs that will be the first to benefit from this evolution, with the Itanium CPU codenamed Montecito and the Xeon codenamed Tulsa. Down the track Intel has also announced plans to put more than two cores onto the Itanium with a product codenamed Tanglewood, but it remains to be seen if that particular technology will trickle down to the desktop.

In a decade's time, advances in nanotechnology and materials science will open the door for some amazing and unexpected changes to the PC. Even the silicon foundation the industry is built on could be threatened by recent advances in the manufacture of wafer-like diamond crystals, while work being done on an area of nanotech called MEMS (microelectromechanical systems) opens the way for silicon based radios and optical interconnects within the PC by building mechanical structures like moveable mirrors on the silicon itself.

As for when a more fundamental shift towards quantum or biological computing will occur, don't expect it to happen in the near future. Recent advances have proven that silicon-based quantum computers are theoretically possible, but just like the recent announcement of the creation of a working transistor on a diamond wafer, there is going to be a huge development phase between these early proof of concept designs and actual creation and production of working semiconductors.

It appears that the next 10 years will be dominated by refining and evolving the way the PC works, rather than reinventing it, which in our terms means huge improvements in system performance and major tweaking overhead. Technologies like PCI-Express, ultra wideband and EFI provide a flexible foundation for new development; both eliminate the bottlenecks of the past 20 years and will really start to shine when paired with a next generation operating system like Longhorn.

PC technology is changing for the better, riding high on the realisation that there is a need for standardising and future proofing. Impending technology contains within it the lessons learned in the short lifespan of the PC to deliver products that can grow with the system, rather than be patched up to speed with a series of inelegant hacks. This revolution is happening and at the current pace, by the time Duke Nukem Forever is finished, the PC will be almost unrecognisable.

Form factors

Most of today's PC components are built around the ATX specification, which was first released in 1996. There have been some unexpected spin-offs, such as the Mini-ITX form factor and the rapidly expanding range of mini-barebones PCs.

Just as designers of mini-barebones units have to struggle with issues of increasing CPU heat, system builders often end up needing custom solutions to deliver small PCs. To tackle this problem, Intel has announced the Balanced Technology eXtended (BTX) form factor (shown in the photo above), taking advantage of Serial ATA and PCI-Express for better airflow within confined systems.

It is unlikely that BTX will impact the wider market, with it debuting in OEM systems sometime next year. With the mini-barebones market starting to get rolling, consumers after small form factor loving will most likely go for a mini-barebones system rather than a BTX-based system.

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REVIEWS

Rattle and hum

Mini barebones systems are the new craze, John Gillooly sees a way to go for some manufacturers.

Oompaloompas are cool. Sure they are unsettlingly orange, and really don't look like you'd want them making food, but how can you dislike those wacky singing midgets?

I have been thinking of them a lot lately, not because of the vocal chocolate addiction of one of our sub-editors, but rather because every time I walk into the labs I am threatened by an avalanche of mini barebones PCs.

As a concept, mini barebones rock. These shoebox sized chassis and motherboard bundles are capable of using normal PC components, albeit with restricted expandability. So that's why I have been thinking small; if a tricked out desktop PC is Willy Wonka, then mini barebones are oompaloompas.

There are several established manufacturers in the mini barebones niche. Shuttle pioneered the concept with the XPC, but other companies like Biostar, Jetway, IWILL and Soltek are into their second generation at least. And like in all corners of the world, except for gubernatorial California, experience counts for a hell of a lot.

Some products show an elegant causality in the R&D process. For example, GeForce FX cards are bloating outwards, swallowing up two or three PCI slots. Conventional mini barebones design has the AGP slot abutting the case wall, making the graphics choice simple: Low end or RADEON. So in order to make room for NVIDIA's beefy offspring, some designs have the PCI slot swapped with the AGP. But doing this means that the end of the video card comes perilously close to the edge of the drive bay. In a couple of boxes we have looked at, it actually presses against the edge, which necessitates packing insulation materials in to stop the video card from shorting on the drive bay. My main concern was for the constant throb of the drive bay rattling an expensive video card to pieces.

But according to Daniel Taranovsky from ATI's product marketing group, 'The card is ... designed to withstand physical trauma... The humming of a drive bay, in my mind, would not compare to the level of shock and vibration all our products pass.'

But we have seen numerous little annoying things like this. For example, we were worried when one unit's heatsink required a kind of blind fishing action to mount and then came off with the CPU attached, vacuum sealed, as the mounting process squeezed all air from the thermal paste layer.

It isn't all doom and gloom, though. Rather than initial attempts to replicate the functions of Shuttle's line, the new breed of mini barebones is ripe with creativity. There are some nice practical approaches, such as Gigabyte's GO-M1600A DVD-ROM drive, which is designed to be paired with its upcoming mini barebones product. By mounting the audio display on the drive, it gives end users the option of having a display with rudimentary stereo functions, rather than making it compulsory.

Or ABIT's DigiDice, which is larger than other brands in order to fit more hardware in. We have had a good look at a prototype of the DigiDice, and while it *is* a tight fit, you can cram a heck of a lot of hardware into it.

If all this sudden interest in the mini barebones market is backed by innovation and not just undercutting of price and quality, then I'm all for it. I was initially worried that we would see mindless repetition of internal design with different faceplates, but everything seen since has calmed my fears. If it ends up with a strongly varied market, with products targeted at a broad range of uses, then I'm happy.

Not as happy as I would be with a pet oompaloompa though. They fit into packing crates. Did you also know our mailing address is printed in the front of the magazine? Even an army of flying monkeys would suffice. . . Anyone?

BENCHMARKS

At *Atomic*, it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic* Labs.

SYSmark2002

SYSmark2002 is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The focus of the benchmark is on Internet Content Creation and Office Productivity tasks, which combine to produce a final performance rating.

Unreal Tournament 2003

UT2K3 is the latest and greatest first person shooter from Epic. The game makes use of the new Unreal Warfare engine, and as such is a perfect benchmark for system performance. We use HardOCP's (www.hardocp.com) benchmarking utility to run a series of flyby benchmarks at varying resolutions to test performance. The utility also features support for a low resolution/high geometry CPU test. Results are in average frames per second.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo, which outputs an average framerate trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for making comparisons between video chipsets.

HSF testing – Chernobyl

To test heatsink fans we use our custom engineered CPU replicator, known as Chernobyl. This beastie pumps a variable wattage through a solid Copper CPU die replica, with a temperature probe mounted in the exact centre of the die replica. Chernobyl results are not directly comparable with real world temperatures, but do provide a very accurate benchmark.

Quake 3: Arena *AtomicMPC* demo

Quake 3: Arena (Q3A), from id Software, is a very popular first person shooter, and represents widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, so we developed our own *AtomicMPC* demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance, or a particular facet of 3D, such as T&L. We can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark to perform these tests. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HDD heatsinks.

Atomic Hot Award

The *Atomic* HOT award is given only to the most kickarse products to hit the Labs, ones that score nine or greater.

ATOMIC TESTBENCH SPECS

Both test systems use Windows XP Professional with Service Pack 1, DirectX 8.1 and the latest chipset and video drivers.

- AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA: www.cassa.com.au)
- Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT: www.abit.com.tw)

Common components

- Corsair TwinX XMS3200 matched dual-channel DDR-RAM (supplied by Altech www.altech.com.au)
- Hercules Prophet II GTS 32MB (supplied by Guillemot: http://au.hercules.com)
- 64MB Apacer memory keys (supplied by Anyware: www.anyware.com.au)
- Hercules Prophet II GTS 32MB (Supplied by Guillemot: www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia: www.creaf.com)
- ASUS 52x CD-ROM (supplied by CASSA)
- Belkin PCI FireWire card (supplied by Belkin: www.belkin.com.au)
- Belkin PCI USB 2.0 card (supplied by Belkin)

BENCHMARK SETTINGS

3DMark2001SE Pro

- 1,024 x 768; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.
- 1,024 x 768; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.
- 1,600 x 1,200; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.
- 1,600 x 1,200; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.

Quake 3: Arena *AtomicMPC* Demo

All tests use Quake 3: Arena 1.27g and our custom Q3A demo recorded by the *Atomic* staff.

- CPU testing: 320 x 240; maximum geometry detail; minimum graphics settings; high sound quality.
- Graphics cards: Low quality – 1,024 x 768; normal quality graphics settings; sound disabled.
- Medium – 1,280 x 1,024; maximum graphics settings; with all game sound disabled.
- High – 1,600 x 1,200; maximum graphics settings; with all game sound disabled.

Albatron

AMD 64 Athlon

K8X800Pro II

Precision cut for stunning performance...

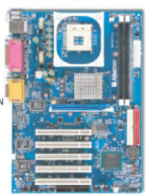
K8X800 Pro II (VIA K8T800 + 8237)

- AMD Athlon 64 CPU Socket 754
- 1600 MHz System Bus
- 3 DDR200/266/333/400 Sockets
- VIA Envy 24PT 8 channel Audio (Bundle SPDIF2 Card Optional)
- 3Com 1Gbits LAN
- 2 Serial ATA150 Channels
- Serial ATA RAID 0,1
- 2 IEEE1394 Ports
- 2 ATA133 Channels
- 8 USB 2.0/1.1 Ports
- BIOS Mirror & Voice Genie

KX18D Pro II (nForce2 Ultra 400/ MCP-Turbo)

- AMD AthlonXP / Barton/ Duron CPU
- Socket 462, with FSB 400+ MHz
- 3 DDR200/266/333/400 Sockets
- AGP 8X , 6 channel AC 97 Audio
- nForce2 MCP-T 10/100 Ethernet LAN
- 2 Serial ATA150 Channels,
- Serial ATA RAID 0,1
- 2 IEEE1394a Ports
- 6 USB 2.0/1.1 Ports
- BIOS Mirror & Voice Genie
- Hyper-Transport Technology

PX848PV Pro (Intel® 848P/ ICH4)



- Intel Pentium 4 Processor
- Socket 478 with FSB 800/1000+
- 2 DDR266/333/400 Sockets
- Support 8X AGP Slot
- 3Com 10/100 Ethernet LAN
- 2 ATA100 Channels,
- Up to 4 ATA 100 IDE Devices
- 6 USB 2.0/1.1 Ports
- Zero Jumper Design
- Watch Dog Timer
- Support H.T. Technology

PX865PE Pro II (Intel® 865PE/ ICH5R)

- Intel Pentium 4 Processor
- Socket 478 with FSB 800/1200+
- Dual Channel DDR400+
- VIA Envy 24PT with 8 ch Audio
- Intel 1Gbits LAN (CSA Port)
- 2 Serial ATA150 Channels
- Intel Serial ATA RAID 0
- Promise RAID 0,1/ATA133
- 2 IEEE1394a Ports
- 8 USB 2.0/1.1 Ports
- BIOS Mirror & Voice Genie
- Support H.T. Technology

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Oakleigh VIC 3166
Tel : 03 9563-3389
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HOT atomic — KM18G Pro Wins Atomic "Hot Award" Aug. 2003

HOT atomic — PX848 Wins Atomic "Hot Award" Nov. 2003

Albatron
www.albatron.com.tw

Soar to Success

Framerate

'Tis almost the season to be jolly, so most of the card manufacturers on the face of the planet are carefully buffing heatsinks and putting the finishing touches on products that will deliver the shiniest Christmas cheer to date, in all its anisotropically filtered, antialiased glory.

This month marks the calm before the coming Christmas product storm. Over the next few months we expect to see a flood of new products, but the market has been very quiet for the past month or two.

While we were tempted to spend the resulting downtime in the labs building a giganto house of cards using obsolete motherboards, we ended up working on a complete revamp of our benchmarking suite. This has been on the agenda for a while, but we were waiting for the launch of Athlon 64 before updating. So now the CPU has been released we are revamping everything from our testbench hardware to the benchmarks that we run.

The end result is a whole new testing suite, which has resulted from a lengthy evaluation process and in depth discussions with industry leading technology companies. We not only wanted to assure that the results we are getting are reliable and replicable, we wanted to make them as fair as possible. The ultimate reason for testing is so that we can give Atomicans the ability to make an informed decision when forking out their hard earned cash, thus we have been working hard to ensure that our benchmarks are fair, equitable and above all, realistic.

Next month we debut the all-new Atomic Testbench 2004 edition, so stay tuned for a new phase in *Atomic* benchmarking.

Leadtek Winfast A350 FX5900 Ultra

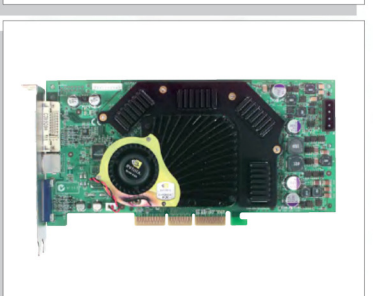
SPECIFICATIONS: NVIDIA GeForce FX5900 Ultra; 256MB 256-bit DDR RAM; 400MHz RAMDACs; TV-out.
CORE SPEED: 450MHz **MEMORY SPEED:** 850MHz **PRICE:** $829
WEBSITE: Leadtek www.leadtek.com.tw
SUPPLIER: Rectron www.rectron.com.au

Incredible – two months in a row and we have two NVIDIA cards toppling the awe-inspiring 9800 PRO, shooting to the top in real world testing. Even if only by half a frame, but this time at a far more affordable price. Looking quite the part, the unusual encased cooling seems to work rather well, and also spares a PCI slot. If you're in the market for a solid FX5900 Ultra, Leadtek as usual has come out with another golden, silver-coloured winner.

Pixelview GeForce FX5900

SPECIFICATIONS: NVIDIA GeForce FX5900; 128MB 256-bit DDR RAM; 400MHz RAMDACs; TV-out.
CORE SPEED: 450MHz **MEMORY SPEED:** 850MHz **PRICE:** $765
WEBSITE: Pixelview www.prolink.com.tw
SUPPLIER: Checksun www.checksun.com.au

We're sad to say that this card is a little mediocre, when you consider it is performing under the speed of the slower core-clocked 3DForce FX5900-128 we looked at below. The price is pretty ordinary also, because $765 is now rather steep for a standard FX5900 equipped with 128MB. It doesn't chew up an additional back slot, performs fairly well, but compare it against the price of the FX5900 Ultra above. . .

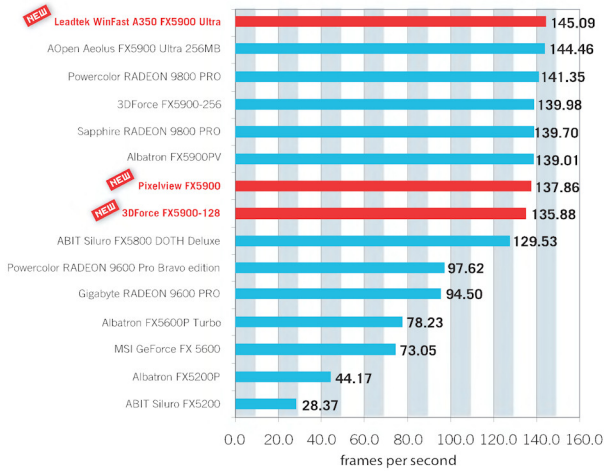


Jaton 3DForce FX5900-128

SPECIFICATIONS: NVIDIA GeForce FX5900; 128MB 256-bit DDR RAM; 400MHz RAMDACs; TV-out.
CORE SPEED: 400MHz **MEMORY SPEED:** 850MHz **PRICE:** $550
WEBSITE: Jaton www.jaton.com.au
SUPPLIER: Jaton www.jaton.com.au

This chunky beefer does in fact gobble up a precious PCI slot, but it's cheap. Way cheap. It costs, in fact, less than last month's Albatron FX5900PV card, which was already inexpensive. Performing just under both the Pixelview and Albatron FX5900s, for comparison's sakes this one is more than worthy of your cash – it rocks. Besides, a card that has the looks to scare off any nosey parkers must be damn good.

Unreal Tournament 2003 – 1,280 x 1,024



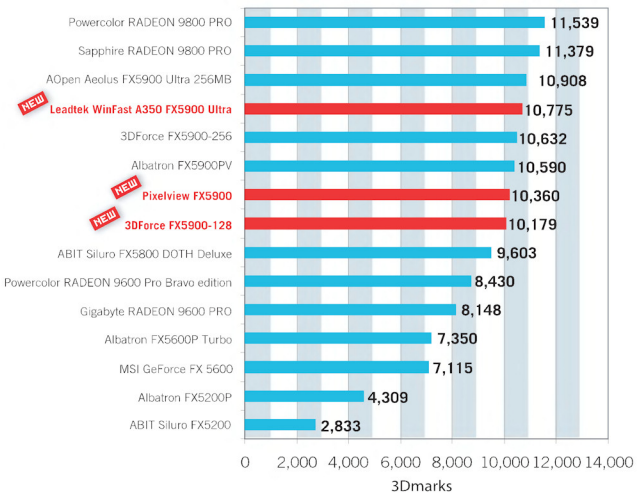
Video cards

We are now coming off a few months worth of paper launches, and should start seeing the next generation of video cards emerge in the guise of the RADEON 9800XT and 9600XT from ATI and the GeForce FX 5950 Ultra and 5700 Ultra cards.

This generation marks a fundamental shift in the way the graphics industry works, with both ASUS and Gigabyte making announcements that they will now produce both ATI and NVIDIA based graphics cards.

The single GPU supplier model has become entrenched in the industry, to the point that we never really expected to see any companies building both RADEON and GeForce cards. With two of the biggest graphics card makers making this move, many other companies should follow. Let's hope the freedom means cheaper products for us all.

3DMark2001SE Pro – 1,280 x 1,024



CPUs

Intel's Pentium 4 Extreme Edition CPU still has not hit retail, despite the fact that samples have been floating around since Intel announced the CPU at the Fall IDF event in San Jose, US.

We expect that the chip will finally be making its way onto retail shelves sometime this month. While no official pricing has yet been announced, the rumoured prices have jumped from initial estimates of about US$700 to a disbelief-suspending US$925. This is still much cheaper than the Xeon upon which the Extreme Edition is based, but the Northwood Pentium 4 is both cheap and eminently overclockable. So Intel will have an uphill battle on their hands trying to convince people like us that we need to spend over five times as much as we would on a 2.6C Pentium 4 (which shuld easily hit 3GHz) for 2MB of cache.

QDI Alacritas 520-KB

John Gillooly tries to go mobile with the Athlon 64.

Specifications:

Athlon 64 3200+; 512MB DDR333; Mobility RADEON 9000; 802.11g; 15in active TFT (1,400 x 1,050); DVD-RW combo drive.

Supplier:
QD Innovative Computer
www.qditech.com.au

Website:
QD Innovative Computer
www.qditech.com.au

Phone:
QD Innovative Computer
1800 660 280

Price:
$4,295

Damn it's good to see an Athlon 64 laptop released already. Our previous history with AMD mobile CPUs has involved seeing the product launch, followed by a good six months of searching for a product that actually uses it. But while we wait for this process to occur, QDI has paired AMD's desktop Athlon 64 with some damn powerful notebook hardware to deliver a desktop replacement solution that sits right at the bleeding edge of the power curve.

A desktop CPU is certainly a powerful solution, but anyone who prioritises terms like 'thin and light' or 'long battery life' when searching for a notebook will want to look at dedicated mobile processors for their needs. If you want something with the grunt of a desktop CPU that you have to carry from power point to power point to power point then a desktop replacement is the perfect solution.

Alongside the Athlon 64 3200+ CPU sits a RADEON Mobility 9000, VIA's K8T800 chipset, 512MB DDR333, 60GB 7200RPM Hitachi hard disk with 8MB cache, inbuilt 802.11g Wi-Fi, 15in TFT and a DVD-R/-RW combo drive. As far as notebook hardware goes, there are few models out that rival it, but unfortunately the Alacritas suffers from some structural issues which dampened our enthusiasm.

Our main problem with the Alacritas was the screen. While the image display itself was quite good, the screen was unforgivably flexible, even more so than Polysilicate screens, which were designed to have a degree of inherent flexibility. It could almost be twisted, and any serious pressure on the lid resulted in ripply fingerprints on screen. It just felt flimsy, which was a big problem with a portable PC.

The other issue we had was something commonly experienced with desktop CPUs in notebooks. The Athlon 64 was a mindless battery hoover, and when we tested the battery life in MobileMark2002 it averaged 92 minutes under load. This really did preclude its use away from mains power.

We also tested the Alacritas with SYSmark2002 and 3DMark2001SE to see how grunty this setup really was. We compared the 3DMark2001SE results to the fastest desktop replacement to pass through the Atomic labs – Toshiba's Satellite 5220, which sports a 2.4GHz Pentium 4-M CPU, 512MB DDR RAM and a GeForce FX 5600 Go graphics. All the tests were done using the 32-bit version of Windows XP Pro.

As can be expected from the older Mobility 9000l, the Alacritas was beaten by the GeForce FX 5600 in the Toshiba 5220, especially as resolution increased. But QDI does have an option to upgrade the graphics to a Mobility RADEON 9600, which would go a long way towards evening up the scores.

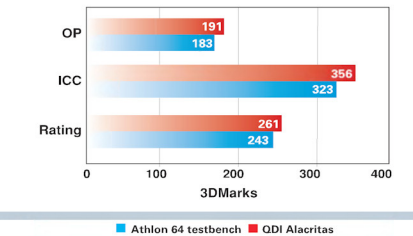
Because of the inherent problems with using SYSmark2002 to compare between Intel and AMD systems, we compared the Alacritas to a testbench running an Athlon 64 3200+, 512MB DDR400 and an MSI K8T Neo motherboard, which used the same VIA K8T800 chipset. Our testbench scored slightly higher than the Alacritas, which appeared to be due to the slower RAM used in the notebook. But the score was still competitive, and will only improve once 64-bit Windows and 64-bit optimised apps start cropping up. \

While it was a very respectable performer, the bendy screen and short battery life worked against the Alacritas. Unfortunately it also arrived at a time when Centrino based desktop replacements were starting to make the power/performance trade-off less extreme, meaning battery powered gaming was starting to become a reality.

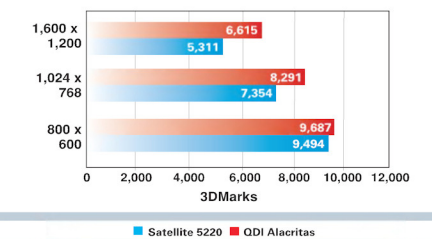
Kudos goes to QDI for getting the Athlon 64 option into the marketplace so quickly. Once the mobile Athlon 64 with its Power Now technology hits the street the battery life problem will be mediated, and with a bit of clever reinforcement, the fragility of the screen would be less worrying. This is one powerful notebook, but it falls just short of greatness. JG

Benchmarking

SYSmark2002



3DMark2001SE



SCORE 7.5 10

During the 1800s, a mysterious character by the name of 'Springheel Jack' supposedly terrorised the streets of London with 'great claws' and vomit composed of 'blue and white flames'.

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www.joltcola.com.au

Lite-On LDW-411S

Specifications:

4x DVD+R/RW/-R; 2x -RW; 12x DVD; 40x/40x/24x CD-RW; 2MB cache.

Supplier:
Synnex
www.synnex.com.au

Website:
Lite-On
www.liteonit.com.tw

Phone:
Synnex
1800 880 038

Price:
$369

With all the big dogs bitching over the two most popular DVD writing standards, dual DVD burners that support both the minus and plus standards are being bought up on a faster scale than single standard drives. This situation is ludicrous, for sure, but that's the way the DVD standards crumble. The 411S is Lite-On's foray on the dual capable market.

With Lite-On being one of the most respected optical drive manufacturers, we didn't expect any different from its latest shooter of photons. It was merely a tad more expensive than its older brother (the LDW-401S), which – *out of the box* – only accepted DVD+ media. Even though there were minor differences between the two, we have had less problems with DVD- (DVD+ could have partially been a knee jerk reaction to avoid paying royalty fees to the DVD Forum for DVD-).

For the included software, only PowerDVD and Sonic MyDVD were provided. Lite-On usually throws in a copy of Nero, but not this time. Where's Nero?!

Not hugely favouring theoretical testing, we compiled 4478MB of two highly compressed zip files for testing the write speed. Equipped with a Pentium 4 2.53GHz and a 7,200rpm 120GB HDD, we set to work. Using our own copy of Nero we timed how long it took to fire up the data; writing to a Verbatim 4x DVD-R it lived up to Lite-On's claim of 15 minutes, churning out a meagre 14 minutes and 56 seconds (5117KB/s).

The days of our drives screaming 'hey everyone I'm burning stuff!' are over as this drive was damn quiet even when spinning at full speed.

Mt. Rainier wasn't natively supported, but with the awesome history of sweet firmware updates (and cross breeding) available from Lite-On (and, well, other hypothetical places) this just may be a small firmware update away.

Shorter than the usual optical drive, at 17 cm long this would work perfectly in a mini barebones machine. Overall, the drive was a rock solid performer and if rewrite speeds concern you, it makes for a fairly good buy.

ND

SCORE 8.5 10

MSI DR4-A

Specifications:

4x DVD+/-R; 2.4x +RW; 2x -RW; 12x DVD; 40x/24x/10x CD-RW; 24x HD-BURN; 8MB cache.

Supplier:
MSI
www.msicomputer.com.au

Website:
MSI
www.msicomputer.com.au

Phone:
MSI
(02) 9748 0070

Price:
$299

There is an immense amount of multi standard burners out there, so manufactures must differentiate themselves from the pack. Well, MSI thinks so, and frankly we agree. Per usual, packaged with the likes of Nero, PowerDVD and Sonic MyDVD, this drive sported a feisty 8MB of cache. This buffer amount was one of the two main factors that set this apart from the Lite-On 411S. The second and most impressive factor was the added support for the new HD-BURN (High Density) technology developed by Sanyo. Using DVD techniques on CD media, this technology decreases the length of the written pits and the track spacing. We're talking 1.2GB+ on a pathetic CD – screw overburns. The one problem here is that only a select range of CDs will work with this. As the drive didn't come with any blank media at all (!), finding the correct CD-R media was a hassle. None of our CDs would write, returning a power calibration error, so obviously these 'select discs' aren't too common.

HOT AWARD

Sanyo claims that because of the similarities, these discs can be read by standard DVD drives that have been firmware updated. This tech just may take off if the media support is increased.

Moving onto the DVD testing, we armed ourselves with a Verbatim 4x DVD-R disc and our two maxi-pressed zip files. It wound the clock back by 22 seconds, producing a finished DVD in a lightning fast 14 minutes 34 seconds. That's a decent leap, burning on average extremely close (5,256KB/s) to its official 4x (5,400KB/s) peak rating.

Both DVD+RW and CD-RW speeds were significantly slower than the 411S, which is something to keep in mind if you plan on regularly using rewritable media.

Dual standard DVD burners are the way to go, especially when you consider the marginal price difference to single standard. Damn cheap considering its features, if you're after a great multi-format burner, the DR4-A is a thrilling laser blaster.

ND

SCORE 9.5 10

MediaMate 200 TV Box

Specifications:

NTSC/PAL Tuner; USB 2.0/1.x output; remote.
Base Unit: 146 x 146 x 28.8 mm

The MediaMate 200 TV Box from S-Media is an external TV tuner for your PC. As well as a standard coax socket, the unit has S-Video and composite inputs, and connects to the PC via USB 2.0/1.x interface. The device performs all MPEG-1 and MPEG-2 encoding on-board, freeing up precious CPU cycles for other functions.

The bundled software allows simple channel management, the ability to schedule recordings, and time-shift capabilities. You can also capture stills, set the aspect ratio and adjust the bit rate, up to a maximum 15Mb/s. The interface is reasonably straightforward, which is handy, as the user manual is somewhat lacking.

Picture quality is average after maxing out the bit rate, and changing the settings to 'DVD Format'. We found that simply viewing television/video the frame rate was smooth and synchronised perfectly with the audio, courtesy of USB2.0. When sitting at least a metre from a 19in monitor, the image was presentable and free of artefacts, but closer inspection showed significant pixilation and some blurring of faster action. There was a noticeable loss of smaller detail, and on-screen text was fuzzy and often difficult to read.

When we jumped into time-shift mode, and the image was madly buffered to hard disk, we found the occasional frame drop and the playback stuttered. This was probably more to do with bandwidth limitations in our test system, as it tried to cope with the throughput from the USB port, sustained writing to the hard drive and displaying a full screen image without losing audio synchronisation. In terms of recording, half an hour of 15Mb/s video will cost you around 700MB of hard drive space. You can play back through either the bundled application, or a standard MPEG player.

With set-top PVR systems, complete with hard drives 40GB or larger, now under the $1,000 mark, you have to wonder whether these types of devices are worth the effort. Although, if you absolutely need to use your PC for television viewing and recording, and you don't need the absolute highest image quality, then this is a simple and capable solution.

SP

Supplier:
Bluechip IT
www.bluechipit.com.au

Website:
Bluechip IT
www.bluechipit.com.au

Phone:
Bluechip IT
(02) 8745 8400

Price:
$369

SCORE 6 10

Belkin F8T030 Bluetooth Access Point/Print Server

Specifications:

Bluetooth compliance: v1.1; Class 1; NAT, DHCP; Max 723Kb/s up, 56Kb/s down; Point-to-Multipoint, up to seven slaves; Internal antenna; 100m radius.

As well as acting as a print server for USB printers, this Class 1 Bluetooth 1.1 AP allows up to seven Bluetooth enabled devices, such as PDAs and laptops, access to your Ethernet network.

We plugged the AP into a spare port on our Ethernet switch, and had a laptop with a Class 1 Belkin USB Bluetooth adaptor sitting nearby. When the device was powered up, it found our DHCP server and accepted an IP address, DNS and domain information. We then set up the Bluetooth adaptor in the laptop, and picked up an IP address from the AP, although in a different subnet.

We were then able to establish a PPP connection between the Bluetooth and LAN. However, there was no support for NetBIOS, so access between LAN resources and Bluetooth was via IP addresses, not My Network Places – a pain in the arse.

Never ones to read manuals, we stumbled blindly into the interface. From there, we could permanently assign an IP address, change the host name and set an access password, if so desired.

As the AP had two external USB host ports, we could attach a printer or two. Only one of these ports was available for printing requirements on the wired LAN, but Bluetooth clients can print to both.

We did some performance testing with the AIDA32 benchmark utility between the Bluetooth adaptor and the wired LAN. The device managed an average bandwidth of 21.4Kb/s, which although not blistering, was acceptable in terms of Bluetooth performance.

Even over a distance of around 25 metres, with a few walls in between, the connection was maintained, but performance dropped to an average of 3.8Kb/s. Although Class 1 devices are rated to 100 metres, connection was lost altogether after around 35 metres. The firmware is still version 1.0, so there may be some refinements over time. A simple to use and reasonably priced Bluetooth solution and the print server is a definite bonus.

SP

Supplier:
Belkin
www.belkin.com.au

Website:
Belkin
www.belkin.com.au

Phone:
Belkin
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Price:
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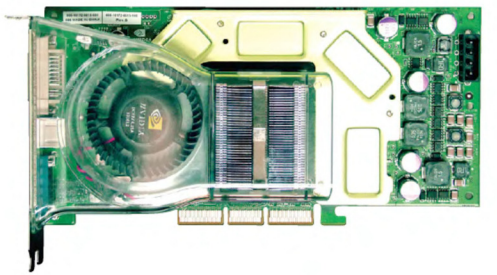
NVIDIA GeForce FX 5950 Ultra & 5700 Ultra

John Gillooly previews NVIDIA's latest salvo in the graphics war.



PREVIEW

We searched hard amongst the flurry of paper coming out of the big graphics companies during October, but there was not a production card in sight. Both NVIDIA and ATI launched refreshed models of cards as part of the pre-Christmas rush, but continued with the unfortunate trend of cards being impossible to find outside of the North American continent.

While the efforts of Australia IT to rush a Powercolor RADEON 9800XT to us were scuppered at the last minute by sluggish couriers, we have managed to obtain NVIDIA's two new reference cards, the GeForce FX 5950 Ultra and 5700 Ultra. Because these are reference designs and not production models, consider this to be a preview rather than the review. We'll bring you a review next month.

Formerly codenamed NV38, the GeForce FX 5950 Ultra replaces the GeForce FX 5900 Ultra as NVIDIA's highest performing GPU. Its core runs at 475MHz and the card uses 256MB of 256-bit DDR running at an effective 950MHz. This card sits squarely in the minor refresh category as it is still based upon the NV35 architecture.

On the other hand, the GeForce FX 5700 is a little more exciting. Targeted at the mid-range, this GPU uses a new architecture and is the first NVIDIA chip to come out of IBM's East Fishkill fabrication plant. What is even more special is that the first silicon from the plant has gone straight into production, without the minor tweaks and revisions seen in the past with chips coming from TSMC.

The mid-range is rapidly becoming the big battleground between graphics vendors, and the GeForce FX 5700 is a hefty weapon on paper. It has a core clock of 475MHz and uses 128MB of 128-bit DDR2 memory running at an effective 900MHz. Despite the high core clock, the use of Low K Dielectrics in the fabrication of the GPU means that it only needs a single height heatsink for cooling.

We tested the cards against the commercially available offerings from ATI at the time – the RADEON 9800 PRO and RADEON 9600 PRO. Next month we will compare the production GeForce FX 5950 Ultra and 5700 Ultra against ATI's XT series.

We tested using an Athlon 64 3200+ with a VIA K8T800 based motherboard and 512MB DDR RAM. The NVIDIA cards were tested with the ForceWare 52.16 drivers and the ATI cards used CATALYST version 3.8.

Our first test is the DirectX 8.0 based Codecreatures benchmark. In it the GeForce FX 5950 and the 5700 beat out the equivalent ATI cards by a fair margin.

This trend was not to continue for the 5950 Ultra, as its scores in 3DMark2001SE and Aquamark show. It only beat the RADEON 9800 PRO by an almost insignificant 3 percent in Aquamark, while the 3DMark2001SE results differed by only 1 percent at 1,280 x 1,024 and 3 percent at 1,600 x 1,200.

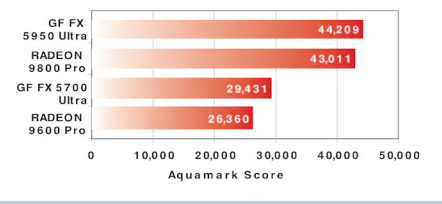
However the GeForce FX 5700 Ultra fared much better against the RADEON 9600 PRO, coming in as the winner by 12 per cent in Aquamark 3. In the older 3DMark2001SE the margin is even more dramatic, with the 5700 Ultra 30 percent faster at 1,280 x 1,024 and a whopping 40 percent quicker at 1,600 x 1,200.

While we are yet to test a RADEON 9600XT, the fact that it is only a faster variant of the existing cards means that we are doubtful it will be able to close the performance gap by much. It looks like NVIDIA has done well by focusing on the 5700 Ultra, and it has certainly become the tastiest offering we have seen in the mid-range of the market since the GeForce4 Ti4200.

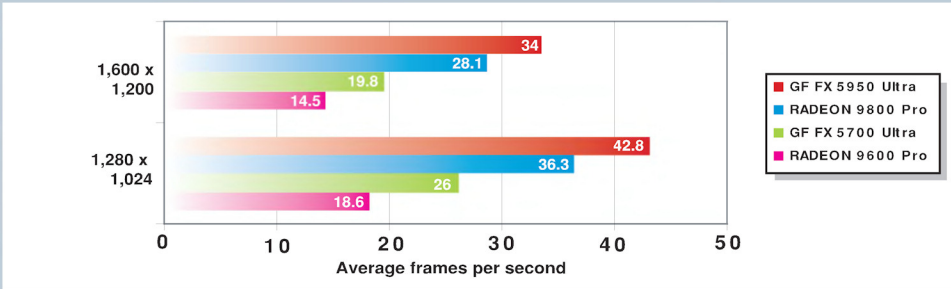
Next month we will compare the performance of production GeForce FX 5950 Ultra and 5700 Ultra cards against ATI's XT cards using our new benchmarks. For now NVIDIA may still be struggling to usurp ATI's crown as the performance king, but it has delivered a rocket into the mid-range of the market and shown that it's still a definite contender in the desktop 3D stakes. JG

Benchmarking

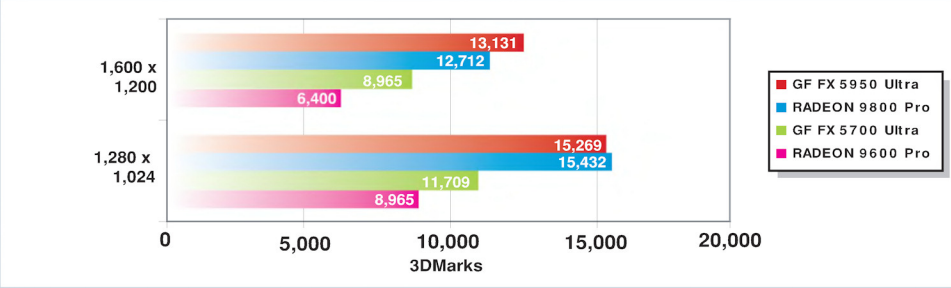
Aquamark 3



Codecreatures benchmark



3DMark2001SE PRO



Creative Inspire T7700

Specifications:

7.1 speaker set;
24W RMS
subwoofer; 20W
centre speaker,
8W per channel;
SNR 80dB.

Supplier:
Creative Labs
http://asia.creative.com

Website:
Creative Labs
http://asia.creative.com

Phone:
Creative Labs
(02) 9021 9800

Price:
$349

By the end of the decade, we won't have separate speakers for multi-channel setups. We'll have just one – a giant ring that mounts to the head, with built-in subwoofer and control unit. Think Doc's mind reader in *Back to the Future*, and you're close.

Creative's T7700 7.1 speaker set brings us towards this psychedelic dream. In the box you get a 24W subwoofer, seven 8W speakers (including a beefy 20W centre speaker), a control unit and enough cables to start your own wire farm. While putting this all together is somewhat of a nightmare, you'll feel very proud of yourself once done.

The easy way out is via S/PDIF, and if you have the connectivity, digital is the way to go.

Bass and volume are controlled through a remote, which hooks up to the speakers using a chunky black cable. Although the chances of you losing the remote are slim, if you do, you'll have a hard time finding an alternative way to change the volume.

The subwoofer is impressive for a PC multimedia solution. Pushing the bass dial past half-way isn't recommended though, unless re-enacting the first scene in *Back to the Future* hovers your skateboard. Along with the sub are two front speakers and a centre speaker, two side speakers and two rear speakers. Except for the three 'front' speakers, they're all identical, so it's up to the user to wire them up correctly.

When testing, we found the rear speakers were drowned out by the side and front speakers, even after tweaking and using auto-calibration. Other than this, the speakers generate high-quality sound, however, this really depends on what sort of sound card you have.

All up, Creative's Inspire T7700 is a standout set of speakers. Just make sure you properly calibrate them with some rear bias, or have the rear speakers close to your back. You'll also need to justify to yourself the need for seven speakers over five, or even two. LB

SCORE 8.5 10

Gigabyte GO-M 1600A

Specifications:

16x DVD-ROM drive;
remote control;
LCD display;
radio and CD/MP3
playback with
PC boot.

Supplier:
Synnex
www.synnex.com.au

Website:
Gigabyte
www.gigabyte.com

Phone:
Synnex
1300 880 038

Price:
$TBA

There has always been a lot of cross pollination between the PC and the car worlds – for example, we took their neon lighting and they took our MP3 playing ability. Gigabyte's new GO-M1600A DVD-ROM drive takes some cues from car stereo design to create one of the most innovative products released this year.

Normally *Atomic* would not even bother reviewing a DVD-ROM drive, as they sit firmly in the generic category nowadays. But this is different. Designed to go into Gigabyte's upcoming mini barebones PC, this drive features a front panel with a display, radio tuner and MP3 playing ability. These functions are similar to those featured on several models of mini barebones, but Gigabyte has decided to leave the choice of having a display up to the end user by packaging it with this DVD-ROM drive.

In order to play music without booting the PC, the device needs power. So it comes with a small PCB that screws into an expansion plate on your case and connects to both an external AC adaptor and passthrough cables from the sound card.

Operation is simple. To eject the drive's tray just push the eject button on the front. Just like a car CD player, the front panel then flips forward on a smooth hydraulic catch. Insert a disc, close the drive then click the face plate back into place.

It is a very cool and unique product, but it does have limited functionality. As a case modding accessory it is great, stealthing the drive and providing knobs and flashing lights at the same time. Unfortunately the dials on the display only show volume; if it had thermal monitoring or fan controls as well this could have been an unbeatable product. As it stands it is good, if very niche in target. Congratulations to Gigabyte for thinking laterally and coming up with such a different take on the humble DVD-ROM, if only all products showed this sort of flair. JG

SCORE 8 10

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XP 2400+	$155	Seagate 80gb 7200	$120	Corsair 512 4000 Pro	$350	Albatron KM18GPro	$165	Altec Lansing 621	$220	LG 52x32x52 CDR	$65
XP 2500+ BARTON	$165	Seagate 120gb 7200	$165	Corsair twinx1gb4000Pro	$699	Asus P4P800 Deluxe	$220	Altec Lansing AVS251	$179	LG 52x CDROM black	$40
XP 2600+ BARTON	$189	Seagate 120gb 7200 8mb	$185	Kingston 512mbtwin3200	$190	Asus P4C800E Deluxe	$339	Creative Inspire 2400	$75	Asus 16x DVDROM	$80
XP 2800+ BARTON	$249	Seagate 80gb 7200 SATA	$165	Kingston 1gb twin 3200	$380	Asus A7N8X-Deluxe	$215	Creative Inspire 2500	$85	Liteon 16X DVDROM	$58
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XP 3200+ BARTON	$549	WD 40gb 7200 2mb	$95	Kingmax 512 ddr 3200	$175	Gigabyte 7VT600L	$110	Creative Inspire 5200	$155	Liteon 48x16 combo	$99
Celeron 2.0G	$110	WD 40gb 7200 8mb	$110	Apacer 512 2700	$145	Gigabyte 7VM400M	$99	Creative Inspire 5500	$379	Liteon 4x DVD-/+	$275
Celeron 2.2G	$115	WD 80gb 7200 8mb	$135	Apacer 512 3200	$185	Gigabyte 8KNXP	$350	Creative Megaworks 5.1	$530	Pioneer 106 4x	$295
Celeron 2.4G	$125	WD 120gb 7200 8mb	$179	FLASH MEMORY		Gigabyte 8IK1100	$225	Logitech Z-340	$95	Plextor 4x DVD+R	$295
Celeron 2.5G	$135	WD 250gb 7200 8mb	$455	Transcend 128mb	$75	Leadtek K7NCR18DPro2	$225	Logitech Z-640	$125	Plextor 8x DVD+R	$565
Celeron 2.6G	$159	WD 36gb 100008mbSATA	$210	Transcend 256mb	$135	MSI 865PE Neo2FIS2R	$285	Logitech Z-680	$525	LG GSA-4040B	$295
Intel P4 2.6 (800mhz)	$299	WD 120gb 7200 SATA	$215	Transcend 512mb	$265	MSI 875P Neo2FIS2R	$375	Monsoon PM-7	$125	MSI DR4-A	$295
Intel P4 2.8	$320	WD 250gb 7200 SATA	$495	Transcend 1gb	$525	ShuttleMN31N	$175	Monsoon PM-9	$195	Sony DRU-510A	$340
Intel P4 2.8C (800mhz)	$355	Maxtor External 80gb	$325	Transcend 128mb MMC	$95	Soltek 75FRN2-L	$139	Videologic ZXR-200	$115	Enlight DVD Player	$99
Intel P4 3.06Ghz	$435	Maxtor External 120gb	$380	Transcend 128mb SD	$99	Soltek 75FRN2-RL	$165	Videologic ZXR-550	$215	Liteon DVD Player	$340
Intel P4 3.0C (800mhz)	$450	Samsung 160gb 8mb	$205	Transcend 256mb SD	$155	Soltek 75MRN-L	$169	Videologic ZXR-750	$299	Nintaus DVD Player from	$125
Intel P4 3.2 (800mhz)	$665	Samsung 160gb SATA	$225	Transcend 128mb SM	$90	Tyan/Supermicro/Intel	$CALL	Yamaha TSS-10 5.1	$340	Viewmaster DVD Player	$135

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Biostar IDEQ 200P

HOT AWARD

Specifications:

NVIDIA nForce3 150; two 3.5in HDD bays, one 5.25in bay; one 3.5in floppy bay; AGP slot supports dual height heatsinks; SATA; 6 channel audio; Ethernet; IEEE1394A

Supplier:
SATO Technology
www.satotech.com.au

Website:
Biostar
www.biostar.com.tw

Phone:
SATO Technology
(02) 9748 2999

Price:
$519

As the floodgates open and the market becomes swamped with mini barebones systems we've had a huge variety of offerings piling up in the labs. Biostar is one of the longer serving members of the mini barebones building community and it was only the second manufacturer to launch a model supporting the Athlon 64, in the guise of the IDEQ 200P.

After noticing some fundamental design flaws on other brands of mini barebones we were blown away by how well thought-out the IDEQ 200P was. It was the most 'cable free' unit we had seen, with the front IO ports connecting to the front of the motherboard, rather than tangling their way around the AGP card to connect at the rear. The other cables were carefully routed around the chassis, allowing for clean airflow through the unit.

To cope with the heat pumping Athlon 64 CPU, Biostar had employed a hefty copper heat pipe cooler. This had a single fan that pushed air across the heatsink towards a ducted grill at the back of the IDEQ 200P; the only externally mounted fan was the one attached to the power supply unit. Despite this we found no overheating issues.

But the real triumph of the IDEQ 200P was that Biostar swapped the traditional placement of the PCI and AGP slots so that the box could accommodate the chunky heatsink of a GeForce FX 5900 series video card (as long as it's only dual slot). Unlike other models we had seen, Biostar managed to do this without jamming the card against the drive bay or blocking ATA ports on the hard disk.

While the IDEQ 200P did not have slick display panels or other fancy features, it was a solid, no nonsense desktop PC replacement with sensible use of space and the careful design that only comes from experience in this field. It wasn't the fanciest mini barebones unit on the market, but it's one of the best. JG

SCORE 9 10

EPoX Mini Me eX5

Specifications:

Intel 865G chipset; SATA; IEEE1394A; six channel Audio; 10/100 Ethernet; one 5.25in bay; one 3.5in floppy bay; one internal 3.5in drive bay; supports dual height heatsink video cards

Supplier:
Westan
www.westan.com.au

Website:
EPoX
www.epox.com

Phone:
Westan
(03) 9541 8888

Price:
TBA

EPoX's feature rich foray into the mini barebones world was based around the Intel 865G chipset and had both multimedia features like those seen on MSI's Mega PC and a focus on performance like the offerings from ABIT and Shuttle. These features came together on the front VFD panel, which could display temperature and system information, or pump out information about the media that was playing. Internally the eX5 was designed for cooling, with an actively cooled copper heatsink that straddled both the Northbridge and CPU and vented directly out the back of the eX5 through a plastic duct. When mounted this assembly became a single heat pumping tube, perfect for keeping the insides of this beast cool.

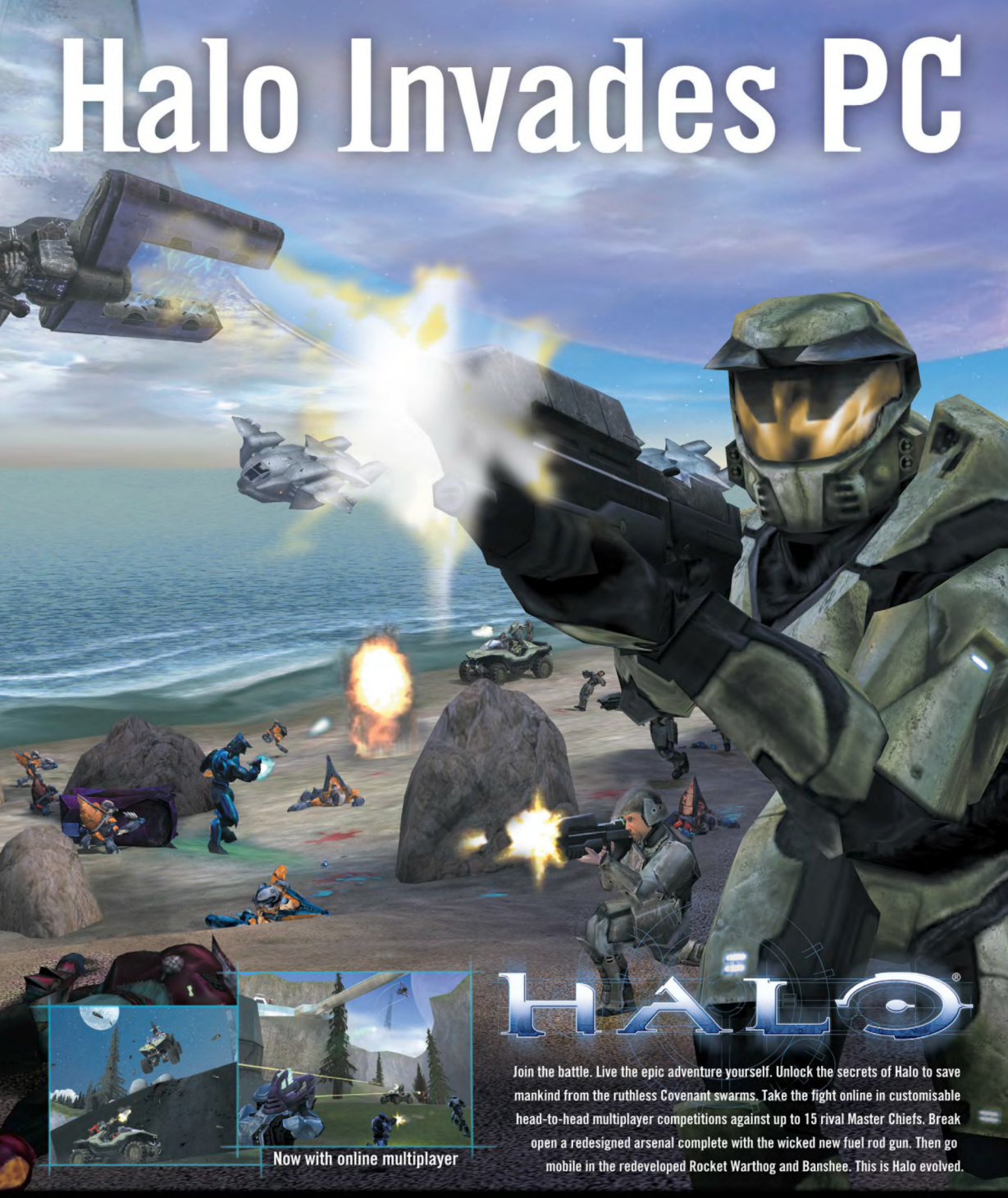
Like most other new units, the eX5's layout of the AGP and PCI slots was such that VGA cards with dual height heatsinks would fit. While the video card did not touch the drive bay, even a medium sized card like a RADEON 9800 PRO blocked the parallel ATA connector if you mounted a drive in the internal removable 3.5in drive bay. EPoX was making slight modifications to the design so that SATA drives could still be plugged in, but the expanse of socket that a Parallel ATA connector sported meant that it needed to be mounted in the floppy drive bay. With a unit this powerful you would want to mount a kickarse video card, so this should be taken into account if you also needed to add any external facing 3.5in devices like a floppy drive or card reader to the eX5. We are currently talking to EPoX about ways to fix this issue.

Without this annoyance the eX5 would be an outstanding product, performing well and full of features. Unfortunately it limited the already restricted expandability options, and held the eX5 back from greatness. For now we will be carefully watching to see where EPoX can take the concept, for the eX5 is a good foundation. JG

SCORE 7.5 10

To find the best tribe leaders, the native Indians of the Mandan nation would perform a ceremony called 'O-Kee-pa'. It involved digging hooks into the chests of candidates and suspending them above the ground.

Halo Invades PC



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ARTOMIC

'The Kings Guard' by Peter Gollner

The Warrior, including sword, shield and armour were all box modelled and then meshsmoothed in 3D Studio Max 4.2.The scene was created with simple geometry and lathed splines.Textures were a combination of procedurals, digital images and custom maps created in Photoshop.There are 24 lights in the scene including one volumetric for the large window.

Create the winning Artomic and win the latest version of combustion, valued at $1,995, from discreet. Email a preview (no larger than 5MB) of your games or hardware-themed masterpiece to artomic@atomicmpc.com.au.

eGAMES

Exploiting commercialisation

Nathan Davis explodes with a different opinion on advertising in games.

If ads were to disappear just now, the world as we know it wouldn't exist. With no ads, sure there's the possibility of human loss on the scale of apocalyptic proportions due to no revenue paying millions of wages, but meh. There'd still be no ads. Ads serve their purpose of letting the public know about products and services. Without advertising, who would possibly know about those spinning sticker printers?

But I'm going off on a tangent here. Considering ads are so much a part of our lives and we are so intent on creating realistic worlds in which to play in, you know exactly what I'm about to say. Sure you do, don't go into denial. I want to see advertising in games become a persistent thing.

That's right, and you can't do anything to change my stubborn mind. There is so much potential in games that is being wasted. We've seen ads in games over the past several years in the form of the occasional billboard or product placement. Sport simulation games in particular must have ads for the experience to feel right. Some are actually for real, but the good majority of ads in games are marketing for fantasy products that don't exist. This fantasy thing is a huge waste of resources – if you're going to advertise, you may as well make it real. But why? WTF would be the (hugely overlooked) advantage for us? Allow me edify you.

From the gamer's perspective it's all about who pays for games. If such a system were to be implemented, with ads realistically and unobtrusively (a must) placed throughout a game world, this would effectively mean that developers could give away big-budget games completely free of charge, whilst still making money. It wouldn't be any different from the current system of fake ads, just real ads that may actually be useful.

For example, in FPS games, the detail could go as far as the brandings of the weapons, soft drinks and even bullets. Of course, this would only prove that games truly are the perfect training ground for handling a weapon in the real world, but it's a good example of how far product placement could go.

An example of real advertising in games is Enter the Matrix; it advertises for both Samsung and Intel in the form of wall posters. Fine, but it didn't lower the cost of the game, and, essentially, *that* is what I want to see. It's a half-arsed start, but a start nonetheless.

However, an ad system would work best on internet-based multiplayer games, in particular massively multiplayer games. As you must be connected to a server to play, when launching the game your machine could download a new small ad package from a cycling subscription-based advertising system. Once in the game, this package would be used for ad textures to be sprayed on particular areas.

Ads already feature in those sick mini games on the web like Yahoo Pool (aw yeah), but that's in the form of an ugly banner. In a 3D world, ads would be a less intrusive, like a poster that you walk past. Heaps. But the products are noticed, and this is the attractive thing for advertisers.

A great way to introduce this idea would be to offer a game in several forms: the usual free demo with no ads; another demo, but with ads (to give people a taste); an ad-implemented full version for free; and finally, a non-ad version that you'd pay for like any normal game today.

I can confidently say that I think the ad version would be the most popular in subscription-based games, as long as the ads weren't intrusive to the gameplay.

Regardless of anonymous others and their bitching, with their completely unfounded fears of ads taking over the world – crud – all our arses are belong to ads. Jack back into the reality program and feel the love. Ads rock.

Manhunt

Specs

DEVELOPER:
Rockstar North
www.rockstarnorth.com
DISTRUBUTOR:
Take2
www.take2games.com.

Brutal. That is the word most commonly used to describe Rockstar North's Survival Horror game with a difference. Manhunt plunges the protagonist, ex-deathrow inmate James Earl Cash, into the gang riddled ghost town of Carcer City. Here he must fight for his life as he tries to escape, using whatever weapons are on hand, while his every move is watched by a mysterious character called the Director.

In a genre dominated by zombies, Manhunt is a disturbingly refreshing game. It conjures up a real sense of fear, and is destined to keep us gaming all through the dark hours over Christmas. Let's hope that Rockstar North can inject the same magic into Manhunt that it did into the Grand Theft Auto games of recent years. And just in case you're wondering, it has already been classified and cleared for sale by the OFLC. JG

Looks kinda roughed-up to us. We're sure he's just had a bad day. . . at the butcher?

War of the Ring

Specs

DEVELOPER:
Liquid Entertainment
www.liquid-entertainment.com
DISTRUBUTOR:
Vivendi
www.vug.com

Based upon the *Lord* of the Rings book licence, this RTS from Liquid entertainment takes place across the lands of Middle Earth as you re-enact events from Tolkien's stories. Thanks to the book licence, Liquid has been able to cover more of the events in the *Lord of the Rings* books within the game, thus making for a more comprehensive experience than the rival movie-licensed titles.

War of the Ring is one of the most graphically advanced RTSs yet released, employing shader effects to make the environment more dynamic. These range from grass that bends as soldiers walk through to little touches like water that ripples when you move your cursor over it.

War of the Ring is potentially the game to drag the *Lord of the Rings* licence out of the murky depths of average and into the limelight. With varied mission structure and innovative gameplay, this is the Christmas RTS to watch. JG

While it's not exactly Warcraft 3, it does look similar. Here's hoping for fresh gameplay.

True Crime: Streets of LA

Specs

DEVELOPER:
Luxoflux
www.luxoflux.com
DISTRUBUTOR:
Activision
www.activision.com.

Nick Kane is a rogue LA cop, dragged into a tale of intrigue in Activision's True Crime, which is an interesting mix of genres. At heart it is a Grand Theft Auto 3 style game, set in a geographically correct re-creation of Los Angeles. But it has many more facets to it. There are three major gameplay types that Nick moves through as the story progresses. The first is the GTA-esque driving, but there are also Max Payne style shooting sequences and Virtua Fighter style fighting sequences.

Despite the danger that it may become derivative, True Crime rises above clone status, thanks to a strong commitment by the developers to making the game fun first and foremost. The accurate re-creation of LA is amazing, with areas where you can train up your skills, and random crimes to bust. With a soundtrack packed with well known songs, True Crime looks set to deliver a well rounded gaming experience when it hits console platforms soon. JG

Nick Kane has the ability to disable gravity every time he kicks. This can be seen in action here.

Need for Speed Underground

Specs

DEVELOPER:
Electronic Arts
www.eagames.com
DISTRUBUTOR:
Electronic Arts
www.eagames.com.au

Need for Speed (NFS) was stuck resting on its laurels for a while there. New games kept coming out, which were passable, but somewhat uninspired. So the buzz running through E3 this year that the new title was amazing came as a bit of a surprise.

Diverting from the supercar focus of previous games, NFS Underground is all about the burgeoning US obsession with illegal street racing. Gone are the Maclarens of the world and in their place are manufacturers like Toyota, Subaru and Mitsubishi. All the cars are customisable to an insane level, which should make for some interesting online action for the PC and PS2 versions (EA and Xbox Live! are not the closest of friends).

This game looks stunning. NFS has always pushed the boundaries of graphics, but for Underground it has gone all out to produce the best looking driving experience we have seen. This one should be huge. JG

The rear end of a car. Slightly more alluring to some than the rear end of something else.

Beyond Good and Evil

Specs

DEVELOPER:
Ubi Soft
www.ubisoft.com
DISTRUBUTOR:
Ubi Soft
www.ubisoft.com

Ubi Soft's internal development studios are doing some amazing work at the moment, creating games that are visually rich while still eminently playable. Beyond Good and Evil (BG&E) is the long awaited epic from Michel Ansel, creator of the Rayman series, and is based around one of those convoluted backstories and plotlines that French gaming is famous for.

You play as Jade, a reporter who is investigating a government conspiracy on the fictional world of Hyllis. This takes you adventuring through a gorgeous 3D landscape where freedom of movement is the imperative. You can venture on foot, or in a hovercraft around Hyllis, with the actual gameplay a mix of various puzzles, light combat and mini games.

Historically, titles of such scope end up falling short in some department, but with BG&E it looks like Ansel has got it right. This game has a chance to become a sleeper classic. JG

It's not technically accurate, but we're sure that camera can take photos. That's if it *is* a camera.

Tony Hawk Underground

Specs

DEVELOPER:
Neversoft
www.neversoft.com
DISTRUBUTOR:
Activision
www.activision.com

For what seems like living memory, Christmas has always been accompanied by a Tony Hawk's Pro Skater title. Not this year, because this year Tony is going underground in the game with the best acronym since Sid Meier's Alpha Centauri; Tony Hawk Underground (THUG).

THUG diverges from the traditional Pro Skater gameplay by adopting a roleplaying approach. It features a story mode in which you create your own skater and begin the journey to become a pro. To personalise this you can upload a digital image of yourself and then download it into the game if you have a console online connection.

Gameplay is much more freeform in THUG, no longer are the skaters' feet nailed to the board, you can now get off your board to do things like clamber up to high drop-in points, which will make for ludicrous combo action. JG

THUG includes an accurate plumbing and roofing simulator. Timmy here has failed the balance course.

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activision.com.au

SHORT CIRCUITS

After months of beta testing, Blizzard has officially released the latest Diablo II patch, bringing the game to version 1.10. The update promises an unbelievable number of improvements, as well as added value for players, including enhanced and refined skills, fundamental changes to inventory and collision detection systems and increased server efficiency. Currently, the patch is only available via Battle.net.

Leisure Suit Larry is back! Sierra has decided to give the white polyester man another chance at game stardom. The new title, named Magna Cum Laude, is being developed by High Voltage Software. The company's previous titles include Hunter: The Reckoning, and classics such as Paperboy and NBA Jam. Larry's been out of the industry for a good number of years now; publisher Sierra won't be able to rely on the success of previous titles to make Magna Cum Laude a hit.

Two bonus chapters can now be downloaded for Max Payne 2 from the Rockstar Games website. Go get some!

BUZZWORDIKAN: EAX

EAX, or Environmental Audio eXtensions, is a positional sound API developed by Creative Labs, which works in concert with Microsoft's DirectSound to produce 3D audio. It's present in all of Creative's cards from the Sound Blaster Live! as well as in the product lines of most competitors. EAX uses a range of techniques to 'fake' 3D sound – such as predefined reverb – as realistic sound rendering is too intensive for today's processors.

SCANNER

Meet the EAX

Say hello to EAX 4.0 – it features three enivronmental effects and makes audio sound 3D! Logan Booker gives it a good looking over.

If you're willing to participate in a quick trip through time, cast your mind back to *issue 31* of *Atomic* – in particular the 'Sound wares' article. We covered the major APIs involved in generating 3D audio – DirectSound, EAX and A3D – while expanding a tiny bit on the future of these technologies. If your trans-temporal abilities are peaking, you may even recall we mentioned that EAX was up for a refresh which was due for release on 28 October. However, Creative has had to delay putting the drivers up for download as technicians still have a few bugs to squash. The drivers have been in development since before the first Audigy cards came out, so extra time isn't a real issue. It's also likely that Creative wants to avoid tarnishing its reputation for compatibility further – you may remember there were bandwidth problems with Creative cards and select VIA chipsets a while back – by making sure the drivers play nice with as much hardware as possible.

Creative is lucky on the competition front, as EAX is really the only option developers have in regards to using a positional audio API. However, this hasn't stopped Creative from pushing the envelope or perfecting EAX and the aural experience it provides. The latest improvement is a new version, EAX 4.0, introduced in the yet-to-be-released driver.

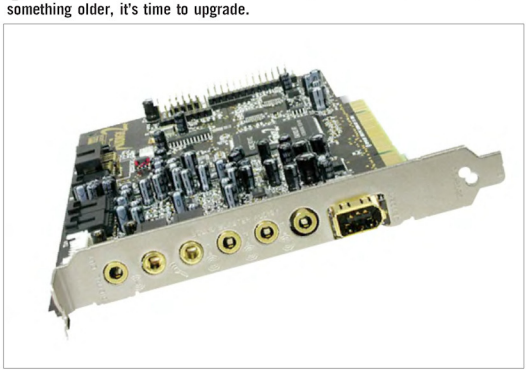
Perhaps the most standout upgrade over EAX 3.0 is support for three simultaneous environmental effects, as opposed to one. George Thorn, Creative Labs' director for worldwide developer relations, says that the inclusion of multiple environmental effects will not only improve the overall gaming experience for players, but also persuade developers to use some EAX 3.0 features that have been gathering dust. 'Having multiple environments available will give developers new reasons to use EAX 3.0 features like Environment Panning,' he said. Environmental Panning allows these new effects to move about the player independently for more realistic audio.

'When you have up to three environments to play with at one time, you can have the primary listener environment, along with two additional environments that pan around the listener according to the player's position in the 3D world. The additional realism that multiple environments provide is going to make EAX 4.0 games a lot of fun to play,' Thorn says.

According to Thorn, owners of Sound Blaster Live! (or older) cards won't be able to take advantage of EAX 4.0. The new revision is only supported by the Audigy range, and there are no plans to release a driver for previous generations. It's not all bad news though: 'We do provide a fallback scheme which developers can choose to use,' Thorn says, 'so that older cards or competitor cards that have only EAX 1 or 2 support will at least provide a basic environment effect.

'But this scheme cannot render multiple effects. You need an Audigy card for that,' he says.

BELOW: EAX 4.0 is only available on Audigy cards, so if you're using something older, it's time to upgrade.



ABOVE: **EAX 4.0's occlusional effect causes UT2003's rocket, passing directly behind Anna, to do so in complete silence. Hold the page close to your ears. See? Nada.**

Thorn also affirms that support for EAX 4.0 is provided by the driver, not a firmware update. This means that in order to use the advanced features in games, you'll need to make sure it's installed. This doesn't present a big problem as all new cards will be packaged with the updated driver once it's available. For current Audigy owners though, a reinstall will mean making sure you have the newer software on-hand.

EAX has always been notorious for using a noticeable amount of CPU time. Modern processors can handle this slice-snatching without breaking a sweat, but it's still a loss we could live without. 'Performance is the same as with EAX 3.0,' Thorn assures. 'There's no audio rendering performance penalty for having all these additional effects.' This, of course, is a good thing to hear.

Currently, there are a number of games already available that support the new capabilities of EAX 4.0. These include Jedi Knight: Jedi Academy, Tomb Raider and Call of Duty. Games need to be specifically programmed for EAX 4.0 in order to take advantage of the new features, and developers won't be left to stumbling around in the dark. 'We will be helping here,' says Thorn. 'Peter Harrison from our UK office has written an excellent sound designer's guide to go with the EAX 4.0 SDK, and this will let developers see and understand the opportunities that the new EAX API offers.'

Expect the drivers to be released when they're ready – which, we believe, will be within the next few weeks. With more and more games coming out with support for EAX 4.0, and the draw of multiple, panning, environmental effects, it's unlikely we'll be deprived for long.

Thanks to Creative Labs for readily providing us with answers to our question on EAX 4.0.

LB

DEVELOPER QUOTE OF THE MONTH:

'No. But it hasn't increased either.'

Director of worldwide developer relations for Creative Labs George Thorn, on CPU usage of EAX 4.0 over EAX 3.0

Big Guns go mobile

Just as Nokia was putting the final touches on its gaming foray, N-Gage, in preparation for the 7 October launch, Intel and NVIDIA were both announcing products that are set to revolutionise the burgeoning mobile phone gaming world.

Intel chose its San Jose Fall Developers Forum to announce the next generation XScale CPU, codenamed Bulverde, which brings onboard three major new technologies – Wireless Speedstep, Quick Capture, and Wireless MMX. The first two are fairly mundane, designed to increase battery life and support high megapixel cameras, but Wireless MMX is designed to enhance mobile gaming.

Intel demonstrated Bulverde by running a port of Moto GP on one of its development platforms, which was done in conjunction with the UK's Climax studios. While the claims of 'Xbox on a chip' were a bit grandiose, this version was noticeably superior to the N-Gage port in both framerate and the ambitious use of 3D graphics.

Then Intel a few weeks later announced that it was pairing with Japanese game giant Square Enix to optimise games for Intel architecture. Rather than just focusing on the desktop, the announcement focused on Handheld platforms and Wireless MMX technology.

A week later during its noticeably GPU free Computex keynote, NVIDIA announced a product named GoForce, a graphics chip designed for mobile phones. Currently this chip is based upon architectures that NVIDIA obtained with the recent purchase of a company called MediaQ, but next year this will merge with development that NVIDIA has been doing internally to create a new generation of hardware 3D accelerators for mobile phones.

One very interesting aspect to this move by NVIDIA is that responsibility for the project has fallen to former Gigapixel employee Phil Carmack. NVIDIA had already acknowledged that it was doing work on mobile graphics before the MediaQ acquisition, so one wonders whether this means that the famed Gigapixel tile based rendering technology will finally see the light of day.

ABOVE: **NVIDIA staff sail to work in a giant boat.**

It will not be until next year that we'll see wide use of these products in phones (Bulverde is still in development, but NVIDIA did show a phone made by Mitac that used the first generation of GoForce), so Nokia does have some time to leverage N-Gage before it gets usurped by this next generation hardware.

Mobile phones have become the new tech battleground, and these moves by Intel and NVIDIA show that we are in for a rapid evolution in technology. We wonder whether the end result will be an open architecture like the PC, where the same high end games can be played on a wide range of phone models using a standard like OpenGL for Embedded Systems (OpenGL ES)?

With this level of pressure coming from the semiconductor industry on one side and the late 2004 release of Sony's PlayStation portable on the other, Nokia is going to need to do something damn special with the N-Gage platform to keep it competitive. The fundamental shift from software to hardware graphics has begun, and mobile phones will never be the same again.

JG

As far as quantum mechanics goes, a Hilbert space is always a Banach space. However, a Banach space is not always a Hilbert space. Go figure.

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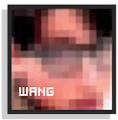
THE ENGINE ROOM

True Crime: Streets of LA



James Wang looks beyond the Hollywood gloss to discover a very different game engine.

You're racing down the streets of Los Angeles at over a hundred kilometres per hour in a car chase. One hand driving, your other is out the window, spraying your opponent with an MP5. His rear window shatters, the car skids and the crash demolishes the local mall. You jump out to greet him: one hand welding an AK-47 and the other a grenade launcher. In typical Hollywood style, he limps out of his vehicle seconds before you send it into flames. A Matrix-esque fight sequence follows; bullet time, Kung Fu – the whole package. Welcome to True Crime: Streets of LA.

Developed simultaneously for the PS2, Xbox and Gamecube, True Crime is an ambitious project between developer Luxoflux and Activision. Its central idea of total gameplay freedom, while resembling the Grand Theft Auto series, is in many ways a distinctively different animal.

GTA broke ground by offering unparalleled freedom of exploration, removing the limits of what you could do and where you could go. True Crime gives you the same (if not more) freedom to explore, but on top of that has integrated a much more robust way of doing it; you'll no longer be driving or shooting, but both at the same time. Once on the footpath, the character you play – Nick Kang – will have much more than his guns to fight with – bullet time and a comprehensive hand to hand fighting system are all incorporated into the gameplay without any interruptions or load screens.

ABOVE: Rapper Snoop Dogg is hidden in the game as an unlockable bonus character.

LEFT: Hand to hand combat in True Crime is a mid-point between the simple button pushing and complex fighting games – all taking place in destructible environments.

Stream Engine

While other games may focus on details such as shaders, lighting and generally fancy graphical gimmicks, True Crime is hell bent on delivering an enormous city without a single gap. The engine was designed for nothing less than simulated 240 miles^2 of Los Angles with no hiccups. And by hiccups, we mean it literally – there are no load screens in the City of Angels, full stop. It may not 'wow' you as a feature but considering that a map for Battlefield 1945 can weigh over 40MB, take eons to load and is only a fraction of the scope in True Crime, this 'load-free' city is obviously not a trivial feat.

To remove the concept of loading time, one must either load the entire level in one go or continuously feed data in a streaming

TOP: If you actually went to the corner of Venice and Crenshaw in LA it would look this way.

LEFT: True Crime's driving sequences differ from GTA in several ways, the biggest of which is the ability to shoot freely from the car.

fashion. With the pathetic memory size of consoles, the first option is plain impossible. But unlike PCs, the data path and bandwidth of consoles is generally wider and much more optimised, making them ideal for streaming game data. Chris Archer, executive producer of True Crime, gave us a detailed run through: 'The streaming concept is very unique in that it allows us to continuously stream data, music and other various items at the same time. The key difference compared to other titles is that the typical way of doing things is to load a large chunk and that is your whole level, when the new chunk arrives, you get a load screen and the next chunk is loaded in. By streaming continuously in smaller pieces we allowed ourselves more detail in each smaller chunk, which in turn allowed us to have a seamless city with much more detail than the competitors.'

Map making – the GPS way

Unlike GTA, which is set in a fictitious city, creating the feel of Los Angles is a much more challenging affair. The sheer scope of the project together with the streaming nature of the engine turns content creation into a nightmarish process. To remove this burden on the artists and guarantee authenticity, GPS (Geographical Positioning System) data was used for map generation. 'This [content creation] truly was the biggest undertaking of the whole project. Somehow the geniuses at Luxoflux were able to figure out a way to compress the GPS data into a very small suitable format that could work on the consoles. On top of all that they found a way to stream in the data and create the roads on the fly using bezier surfaces and patches,' Archer said.

Beziers are curved surfaces that can be represented with very compact maths. Passing these along is much more efficient than passing full polygon meshes. Although, once the bezier arrives at the processor, it is re-tessellated into polygons. Archer said that the saving in bandwidth during its journey is well worth it: 'We really had a great improvement in both framerate and memory usage when we went to beziers surfaces versus polygons. I think though that the memory usage was the biggest saving, especially for the artists and the look of the game. This allowed us to put more detailed artwork and more effects on screen than we ever imagined we could, and that always makes the art staff and the consumer very happy.'

Made in Hollywood

To get that cinematic feel, True Crime has leveraged the best that Hollywood has to offer. Whereas many of the games we've covered use extensive rag doll to take care of soft body physics, True Crime opts for professional motion capturing. 'Because of the extra cool motion capture that we took (1,000s of frames), all of the falls and hits and moves seem real, like you might see in a rag doll model, but because of the expertise of our motion capture and animation teams, this [rag doll] was not needed,' Archer explained. Hand animation based on motion capture gives the artists total control of fine details and the results, while not random, are much more refined and can give that particular 'feel' that's only possible with direct manipulation.

When the names Christopher Walken, Gary Oldman and Michael Madsen come together, you'd be expecting the next Tarantino film. Like you, we were equally shocked to find out that they are the key voice talents, among a huge list of others, to appear in True Crime. The sound cast doesn't stop here; True Crime incorporates over 50 original tracks from some of the top US West Coast rappers including Ice Cube and Snoop Dogg. With such strong names behind voice and sound, True Crime should get all the gritty feel it needs.

'Genre-busting' as a buzzword gets passed along a lot these days. True Crime: Streets of LA doesn't 'bust' any genres but melds many into one. It removes the sense of what is possible in a driving game. Although it may not do bullet time as well as Max Payne, or fighting as well as Virtua Fighter, the seamless flow through styles is truly unprecedented on this level. Couple this with its unique technology and amazing voice talent and GTA should have some real competition soon.

JW

ABIT and THQ presents TequiLAN Sunrise!

Sydney, 9 October 2003

Playin' with tequilas

Ever had a grand fantastic night of boisterous merrymaking? A night so grand, and so fantastic, that the elves themselves in Santa's workshop on Christmas Eve had to cry themselves to sleep because they weren't invited?

Turn those frowns upside down because TequiLAN Sunrise was such a night! This madhouse event was hosted by an awesome combo – ABIT, THQ, iStarZone and *Atomic* – a collective group of the top teams in hardware, software, LAN gaming and journalism.

Not only were Atomicans, general partiers and company bigwigs there in spades, but also alcohol, food and freebies! Giveaways were kindly supplied by ABIT and THQ, so mad props to these amazing companies for their generosity!

Atomican Wilkshake won the Warhammer 40K contest, *Atomic* staffer Cathy won some beer (minus glass) after an unfortunate bag-throwing incident, and *Atomic* editor Ben was very much dispensing liquid joy to anyone who wanted it. So everyone won something, somehow.

The turnout of *Atomic* readers was both absolutely terrific and very much welcome. Those who had met one another before had a chance to dance again, and anyone who'd missed out on previous events had the opportunity to chat and drink face-to-face.

We believe it was a super night, and everyone who managed to get home afterwards thinks so too. *Atomic* would like to thank all who could join the fun, as well as give a hugely massive thanks to ABIT and THQ, for making it one of the most wicked events of the year.

All involved were ecstatic about the outcome and hope to do it again!

Felipe

'Plenty of high profile people there from great companies, which means that *Atomic* is sending the right message as an influential medium for the industry.'

'Thank you Sally for all the top-ups of red wine . . . Thank you Ben for the drink . . . Thank you Snapdragon for the drink . . . Thank you Mozza for the drink. . .'

The_Salty_Peanut

'Once again, cheers to everyone. I had a great night with a great bunch of guys and gals, met some new people, which is always good, and generally loved every minute of it. Top stuff guys.'

Chaos.Lady

'Head still kinda hurts, stomach still kinda queasy. Many, many vague memories. Smelling like a brewery and covered in red ink.

'To the ABIT guy who I scarred for life by offering myself in exchange for his top drawer. . .'

ABIT MAX3 – motherboards for tomorrow, today

The MAX3 are ABIT's newest boards in their highly respected MAX range. MAX motherboards abandon legacy features like Serial and Parallel ports, using the room to mount more ports that you will actually use, like USB 2.0 and IEEE1394a. All of ABITs MAX3 motherboards feature its OTES cooling system. This covers and cools the MOSFETS and other heat generating chips. Sporting onboard Gigabit Ethernet and featuring 8x AGP and kitted out with extras such as S/PDIF Optical in and out connectors, six 150MB/s SATA channels, six USB 2.0 ports, IEEE1394a support and six channel audio, this board will have you laughing with fits of pleasure for a damn good while. Making all your peers quiver with fear, the feisty legacy-free MAX3 is the one to own.

Warhammer 40,000: Fire Warrior

Welcome to the forty-first millennium. The Imperium of Man has endured hundreds of years of bloodshed and pain. It's an austere and dark world, full of barbaric Orks, the unfathomable Eldar and other countless evil enemies. Awaiting your orders for battle, you sit and ponder. If you beat this battle and survive, you will partake in the Tal'issera Ritual, the highest honour bestowed only on the greatest and bravest of fighters.

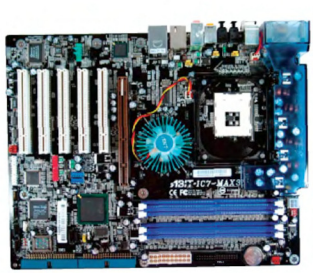
Prepare for fiery hell, you have 24 hours of torturous combat ahead of you to fight and destroy some of the most ferocious enemies you're ever to come across. Blast your way through many locations, as you prove you are not just another fighter, but a legendary slaughterhouse.

ABIT µGuru

Do you classify yourself as a guru? After many years of computer advancement, desire for a faster system goes deeper. You seek hardware enlightenment. ABIT's exciting new µGuru motherboard has the built-in ability to not only induce uncontrollable flows of dribble from everyone who dares gaze upon it, but also the extremely sweet ability to finally be able to overclock your CPU and tweak your BIOS – all this whilst in Windows. This is something to respect with high reverence – and you can actually save three separate settings for diverse purposes.

Spreading right across the globe is the awareness of tweaking and its massive returns and advantages.

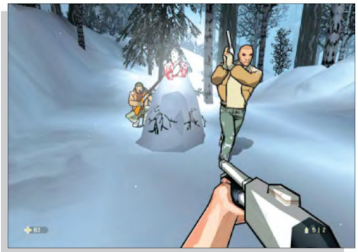
A sea change is about to hit the shores; people are no longer satisfied with lacklustre stock-performing machines. The demand for interactive and enlightened hardware is nigh. Do you guru?



XIII

One may be the loneliest number, but John Gillooly knows XIII is the finest.

HOT AWARD



The graphic 'pop ups' aren't merely decoration in an Adam West Batmanesque way - they are pretty and helpful!

Cel shading lends itself particularly well to snow. And snow covered guns. In fact, we just love cel shading to bits.

Specs

PC

REQUIREMENTS: 700MHz CPU; 128MB RAM; 32MB 3D accelerator; 120MB HDD.
RECOMMENDED: 1GHz CPU; 256MB RAM; 64MB 3D accelerator.

Developer:
Ubi Soft Paris
www.ubisoft.com

Publisher:
Ubi Soft
www.ubisoft.com

Distributor:
Ubi Soft
www.ubisoft.com

Phone:
Ubi Soft
(02) 8303 1800

☺ Great storyline; stunning graphics; intelligent use of audio.

☹ Quirky save game system.

SCORE 9.5 10

We have been waiting years for a game like this. After Half-Life raised the bar for single player shooters we expected a flood of strong, innovative games. Instead we have had sparse gems and a cubic arseload of mindless blast 'em ups. XIII combines the bravest use of Cel shading so far with a storyline that actually matters, reviving our faith in the first person shooter.

It was developed in France, but don't hold that against it. XIII is a tale of conspiracy and intrigue in the United States, based on a French graphic novel. You begin the game waking up on a beach, disoriented and injured. With no idea of who you are or why you are there, you're instantly assailed by gun-toting hoods. Thus begins a journey of discovery, as you track down your past. And then you discover that you're wanted for assassinating the US President.

XIII's story is told through clever use of comic book style cut-scenes and in-game events. In fact, one of the great achievements is that the developers have managed to capture the look and feel of a graphic novel without making the game cartoonish. It is easy to suspend disbelief thanks to the real world storyline and after a short while you barely notice that your world is flat-shaded.

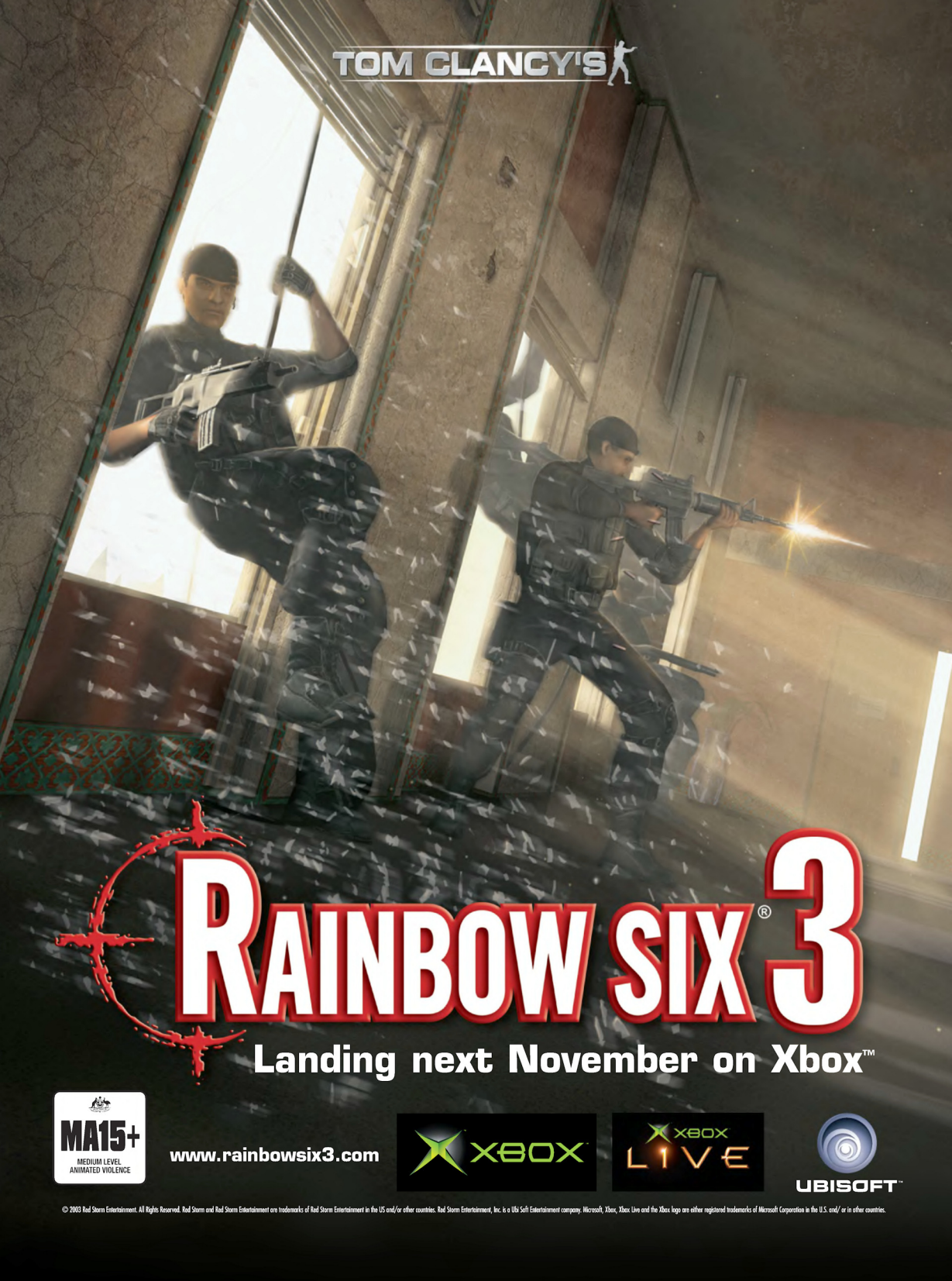
A lot of this is thanks to the Unreal Warfare engine, around which XIII is built. As simple as the graphics seem, it does take some serious background maths to get the shading right. And it runs like an absolute dream on various levels of graphics hardware, thanks to the simplicity of the final image.

Like all great games, XIII is full of discreet touches, leveraging the graphic novel style to add to the gameplay. One way that the story's told is through a series of panels overlaid on your view that show what is happening up ahead. This may involve showing the patrol path of a guard, or the display of a chunk of narrative that is just out of sight. When you overhear people talking, a speech box pops up on the screen, but one nice little touch is that the little arrow on the box moves, staying above the speaker. As these conversations usually happen just out of sight, it helps you get the drop on the baddies by knowing exactly where they are. And these are only some of a multitude of subtleties that lift XIII above the average.

Normally first person shooters are fun, until you reach the first 'sneak-to-point-A-without-being-seen-by-the-guards-or-security-cameras' sequence. Well, XIII has the proud honour of having some of the most playable stealth sequences seen in this sort of game. As long as the bodies stay out of sight and guards die before hitting an alarm, you have a lot of leeway to wipe out baddies, rather than just wait for the right nanosecond in the patrol path to sneak past. These sequences have a much different pace to the rest of the game, but they are enjoyable experiences rather than levels to be suffered through.

XIII sucks you in with looks, then blows you away with gameplay. It's still very much a first person shooter, but it tells a tale that you actually want to follow through to the end. It's such a rare thrill for a game to come through with the goods like XIII does, maybe the French aren't that bad after all.

JG



Max Payne 2: The Fall of Max Payne

Entering bullet time, Nathan Davis refuses to give in and sauce-ifies some bad guys.

HOT AWARD

'Guys, do you realise just who I am? Make it easy on yourselves and just fall over.'

Risking it all, Max the cleaner rids the streets of dangerous explosives. Purdy ones.

Specs

PC

REQUIREMENTS: PIII 1GHz; 256MB RAM; 32MB TNL video card; 1.7GB HDD.
RECOMMENDED: P4 1.7GHz; 512MB RAM; 64MB TNL video card.

Developer:
Remedy Entertainment
www.remedygames.com

Publisher:
Rockstar Games
www.rockstargames.com

Distributor:
Take2 Interactive
www.take2games.com

Phone:
Take2 Interactive
(02) 9482 3455

☺ More of Baseball Bat Boy. Everything you could want from a Max Payne game, plus more.

☹ Too short – leaves us begging for more. Could have had a deeper explanation of the story.

SCORE 9.5 10

Facing the past is like kissing the mouth of a gun, a bullet trembling in its dark nest, ready to blow your head off. Love kills. Gamers have been patiently waiting for it and here it is – the return of our favourite depressed guy, Max Payne. This time he's knee-deep in trouble involving a woman – this is his love story, and it's a jewel.

Like the original, the storyline makes for an interestingly twisted experience, even the dreamtime 'prologue' sequences make a return, and thanks to the powers that be there's no confusing follow-the-dark-red-paths mazes.

The physics in this game rocks, in particular the implementation of ragdoll physics. You shoot someone – or something for that matter – in any certain place, and it'll act accordingly, like it would in our real world. Like a bullet or four hitting a human arm, the character's body will follow the arm. No crappy SoF2 scripted deaths, just good dynamic killing. Even just walking through a room, no matter how careful you are you'll knock over so many things Mr Clumsy himself would be impressed. That is, quite simply, cool.

Bullet time (BT) is back, and better than before. Now you are rewarded with bonus BT every time you hit an enemy. Also, without affecting your speed, you go even deeper into BT when you take out multiple enemies, slowing the world around you but not affecting your own speed. Additionally, when reloading in BT, it's instant – do a quick spin and you have yourself a full clip. All of this really adds to the excitement of using bullet time.

Cutting to the action: the building begins to moan. Seconds later leaping out the window you spot him, falling. Equipping your Dragunov, you peer through your scope – training the black cross of death on the never-ending stream of enemies intent on filling, with waves of lead, your now-motionless newfound love, Max.

'What the heck?', you say. Well, this time around you also get to play as a chick. The storyline works very well with the gameplay, twice switching to your hot female counterpart, Mona Sax. When you first change over to her, you jump back in time and play the experiences that she has just been through while helping you. This way you get to see and experience both sides of the story. This switching characters works really well and adds a good dollop of intrigue to the story. Lara, eat your heart out – Mona can slow down time.

This game gleams in many ways, and is very re-playable. In fact you will be begging for more, as this is merely a weekend-long game. But if the mods for the original are anything to go by, the game has quite a life ahead of it. If you liked the original, chances are you'll love this one. It's a similar experience, but with far more enhanced graphics and gameplay, plus you get to play as a girl.

This is yet another gripping chapter in the life of our favourite poetic hero – a damn hot must-play. It's not all that often that a second incarnation of a game is as exciting/different as the first, but MP2 does just that with even more vividness. In all his power and sweet ability to slow time, Max is back, and the world is out to get him. It's about the love and the pain. It's the ultimate gripping choreography of bullet-flying brilliance. ND

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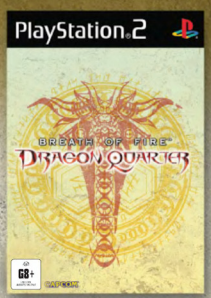

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Crimson Skies – High Road to Revenge

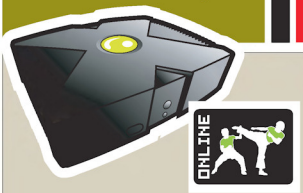
There's one more good reason to get an Xbox, discovers Ben Mansill.

HOT AWARD

Check out the water effects! It may be a console, but this is GeForce 3 pixel shading at work right here!

How can you not love the design of the planes. The 'Devestator' is the first bi-plane to be truly sexy.

Specs



XBOX

Developer:
Microsoft
www.microsoft.com/games

Publisher:
Microsoft
www.microsoft.com/games

Distributor:
Microsoft
www.microsoft.com/games

Phone:
Microsoft
(02) 9870 2200

Escapist fun in a fresh and original world.

A couple of fiddly missions.

SCORE 9 10

This isn't the Crimson Skies that was released for PC a couple of years ago, but it's the same 'universe' (alternative post-WW2) and developer (Microsoft).

What it *is*, is a mindlessly perfect arcade flight game which does a most excellent job of sucking you into its cleverly designed world. When we played the PC Crimson Skies, it was clear that this was a game far better suited to the console. For whatever reason, this isn't a port, but a completely new game. We're seeing that, unlike originally anticipated, PC games are not being ported to Xbox. Perhaps Microsoft want to keep the two gaming platforms as distinct as possible. Sounds fair and reasonable.

Xbox Crimson Skies looks better and plays better than the PC version. It's also one of the best looking Xbox games yet released. Not only do the worlds in which you fly look great – they're huge too. A good deal of work has clearly gone into creating terrain which suits the air combat. There's nothing more satisfying in a flight game or sim than sweeping low and fast through canyons, and this game features nothing but that. Whether the canyons are city skyscrapers, volcanic islands or Grand Canyon canyons, all the worlds are loaded with character and a joy to explore. These huge worlds are clearly not the work of a random 'bumpy hill' terrain generator, each and every crevice has been carefully hand sculpted.

The air combat is fixed in the third-person, and is 100 percent arcade in feel, as is the combat. But it's not all dogfighting. Part of the charm of this wonderful game is that it immerses you in the game solidly, not merely as a pilot, but as a character. Varied missions involve manning anti-aircraft guns – sometimes mounted on Zeppelins. They're fun, and thankfully come in just the right dose before becoming repetitive. Another extremely tasty mission has you manning a variety of mounted guns on a train as it travels through hostile territory being attacked by aircraft, rocket trucks, Zeppelins and even another armed train!

The Crimson Skies world has a piratey, buccaneer feel to it. With a giant Zeppelin being your main ship/home base. It's a dashing and romantic place to be. At one point, you hook up with a tribe of dogfighting Navaho Indians, at another, you're attacking a giant robot spider; very much like the thing in *Wild Wild West*. It's all fast paced action with a ton of clever variety and oodles of character. It's all very camp and most certainly should not be taken too seriously.

Notably cool is the design of the planes. They're sort of pre-WWII in design, but from a universe where industrial art meets just plain cool. Even the weapons follow this school of design, like the near-useless magnetic missile and the slightly less useless, but cooler Tesla Cannon.

The cut-scenes add the final flavour, which tops this game off as a very slick and polished pro job. Really, had this launched with the Xbox it would have been a far better reason to buy one than Halo. It's not perfect, there are some annoying 'Tests of Skill' midway through, which interrupt the flow of the story and aren't fun, but plain finicky. That's the only bad part though, everything else is pure quality.

BM

The Simpsons: Hit and Run

John Gillooly finally finds a perfectly cromulent Simpsons game.

Retail locations from the show, like The Android's Dungeon or Moe's Tavern, give characters a chance to purchase new outfits.

The game is permeated with obtuse Simpsons references, like ol' Frostillicus in the fridge.

Specs

PS2

Developer:
Radical Entertainment
www.radical.ca

Publisher:
Vivendi
www.vug.com

Distributor:
Vivendi
www.vug.com

Phone:
Vivendi
(02) 9978 7722

☺ Nostalgic overdose for *Simpsons* fans; frantic, fun gameplay; Lenny.

☹ Simplistic at times; The missions can get repetitive.

SCORE 8 10

I keep getting the mental image of two slightly chubby guys running towards each other along a suburban street, clinging to copies of The Simpsons: Hit and Run. They meet, look at each other with delight and scream 'It doesn't suck!' So is the pent up frustration felt by *Simpsons* fans with the historically poor record of games based upon the hallowed franchise.

The Simpsons: Hit and Run is not the greatest game ever made, but its strength lies in two areas; it treats the subject matter with a modicum of thought and the designers have concentrated on building a fun underlying game. With a strong nod towards Grand Theft Auto, Hit and Run sends you on a series of missions throughout Springfield. These missions often emulate sequences from TV and are enhanced by a mix of new dialogue and cleverly appropriated sound bites from the show.

It is all a bit outlandish with characters sometimes shoehorned into clichéd game situations, like the mission where Homer needs to purchase the Plow King truck from Barney in order to ram Smithers' car off the road. But it is at heart a whole pile of fun, and the missions are both numerous and well paced.

Unlike GTA, Hit and Run is based around several levels, which all feature different Springfieldian landmarks. There are five playable characters – Homer, Bart, Lisa, Marge and Apu – and each has a different part of the city for their frolicking. Each of these areas are smattered with buildings that have some sort of Simpsonian significance and provide subtly different challenges when hooning around smashing crap up. The structured missions largely revolve around the tried and true 'move-from-point-A-to-point-B' structure, but to mediate this developers have encouraged wanton destruction of the environment on the way.

Every time you smash into something like a tree, phone box or light pole, you get money, which can be exchanged for new outfits and vehicles. Outfits are taken from memorable episodes and include garb such as Homer's Mumu and Bart's Ninja outfit. You need to watch out though, if you smash too many things Chief Wiggum will come after you in an atypically aggressive fashion to slap down a $50 fine. There are no guns in Hit and Run, just lots of smashing stuff, but thankfully it doesn't feel too kiddie-oriented, as you leave a wake of destruction wherever you go.

Rather than go for a Cel shaded look, the game is rendered in simplified 3D. There is a short period of disbelief suspension required until this seems natural, but in the end it works better than if the developers tried to replicate the exact look of the cartoon. Most of the time the landscape is flying by in a cloud of splintered wood so you don't really notice, and the landmarks of Springfield are all beautifully made.

The Simpsons: Hit and Run lacks that special something that makes a game great, but it is fun and light years ahead of previous offerings based on the licence (the old arcade game being the notable exception). With days of amusement for *Simpsons* fans and a damn fun experience for all, Hit and Run is one of the best car crashes of gaming and television to date.

JG

There's more than just one type of bone fracture. For example, when the bone doesn't break all the way through, it's greenstick; if it's crushed, it's comminuted.

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www.ageofmythology.com

Prince of Persia – Sands of Time

Allison 'gramyre' Reynolds masters her cutlass skills.

HOT AWARD

Enemies will not be dispatched through the Prince's sword alone, the dagger is needed to take back the Sands of Time.

The key to SoT is fluidity of movement, you can always use your weapons no matter how contorted the position.

Specs

OFFLINE

PS2

Developer:
Ubi Soft Entertainment
www.ubisoft.com

Publisher:
Ubi Soft Entertainment
www.ubisoft.com

Distributor:
Ubi Soft Entertainment
www.ubisoft.com

Phone:
Ubi Soft Entertainment
(02) 8303 1800

A good game that gives gorgeous graphics.

Occasionally unpredictable camera.

SCORE 9 10

Looting and showing off is bad, or so my mum tells me. The Prince of Persia finds out just how bad after he vandalises an hourglass filled with the sands of time. The result? All the people he loves are turned into sand zombies and they want his blood. Being a prince and all, he can't leave things like that, so off he goes to kill the baddies, rescue his father and get the girl, in one energetic adventure.

Prince of Persia – Sands of Time (SoT) comes almost 15 years after the original groundbreaking Prince of Persia and thus has some large shoes to fill. SoT takes the original recipe of a rich storyline and great characters and makes full use of today's available technology to make a solid game.

But does it catapult action/adventure gaming into the future, as the original did? Maybe not.

We enjoy games that give attention to detail, and SoT has detail to burn. Lighting gets top billing at every opportunity. Whether streaming down from decorative ceilings or seen through gauzy drapes, to playing in the folds of the Prince's pants, the light looks true to nature and is done very, very well.

Quality time has been spent on the Prince. His movements are graceful and he keeps his toes neatly pointed at all times like nice boys should. Modelled with elite athletic musculature, there is very little the Prince cannot do. Run along walls? Sure! Ascend and descend high columns? Just like a Greenpeace protester up a redgum!

Back-flip over foes? Can you say federal politician?

By pulling out his acrobatic fighting skills the Prince gains an advantage over the lumbering sand zombies and feral scarabs. But by sheer weight of zombie numbers, combined with the need to freeze an opponent before dispatching them for good, this advantage is removed and some hectic battling is required to bury them.

While the feats to be performed may be moderately difficult, the controls to achieve them certainly aren't. I spent several hours playing SoT with my daughter and not once did we throw the controller at the screen – proof positive controls are easily mastered. The revolutionary ability to turn back time (L1) makes it possible to re-do something you have royally mucked up, or re-fight a scene that got you killed. The other feature of slowing action to the ubiquitous 'bullet time' ensures slaying sand people is less a key mash and more a choreographed dance with a sharp implement.

There was one thing that made me cry more at times than falling on the spiky sharp things, and that was the when the camera view would occasionally become stuck in tight places causing an extra handicap to some tasks. Apart from these glitches, the camera is fluid and works well with the control system. And if you get geographically confused at any point there is a zoom out button that helps you get your bearings in the, at times, massive levels.

Prince of Persia – Sands of Time is a solid action/adventure console game that looks great, plays well and is quite a lot of fun. It doesn't exactly turn back time to the halcyon days of its predecessor, but who wants to live through the early 90's again anyway?

AR

Alf, the cute, furry alien from the planet Melmac, had a great love for foam of the polystyrene persuasion.

Age of Mythology: The Titans

Logan Booker would have preferred this to have sunk with Atlantis.

Specs

Developer:
Ensemble Studios
www.ensemblestudios.com

Publisher:
Microsoft
www.microsoft.com

Distributor:
Microsoft
www.microsoft.com

Phone:
Microsoft
(02) 9870 2200

☺ New Atlantean side; gameplay dynamics; more single player missions.

☹ Lacking upgrades for the other sides and general game improvements.

We've always been fans of Ensemble Studios 'Age of' series, particularly Age of Empires II, where gameplay was both fast and satisfying. With Age of Mythology, Ensemble moved from 2D to 3D, and in the process slowed gameplay. This resulted in a slightly more tactical – and sluggish to start – game.

Age of Mythology: The Titans is an expansion that introduces a new race, the Atlanteans, and several new single player missions. By far the biggest change is the addition of the new side, which plays very differently from those already available.

The Atlanteans have a few perks: their units don't need to return to a resource drop-off point; almost all units can be upgraded to heroes (improving their abilities); and some of their superpowers can be used multiple times. Their downside is that all their units are expensive, and unless they're upgraded to hero status, tend to get eaten alive.

In single player you control the only survivors of the sunken Atlantis, stranded on a cold, inhospitable coast. Everyone's of the opinion that the gods have abandoned them, so it seems the right thing to do to pick up some new, Greek ones. This, of course, doesn't sit with the Greeks, and that's when the fighting starts.

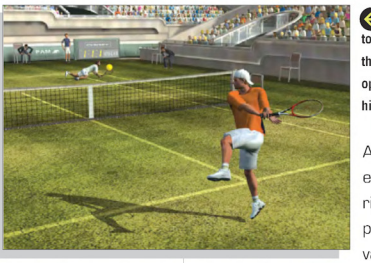
Despite this, it's still the most disappointing expansion I've played since Elite Force. Titans didn't add anything to the other races, and, apart from the altered gameplay dynamic of the Atlanteas, made no serious improvements on the game itself. While it's nice to have another side in the mix, the deficiency of newness was severe enough that it will hurt sales. It all made for a lacklustre expansion. LB

REQUIREMENTS: Original AoM game; 450MHz CPU; 128MB RAM; 16MB DirectX video card.
RECOMMENDED: 1GHz CPU; 256MB RAM; 32MB video card.

SCORE 5/10

Top Spin

Grass specialist Ben Mansill calls an ace.



Bloody Lleyton is a tough little bugger. Easily the best computer controlled opponent in the game, and his trademark moves hurt.

Pulling legend shots makes you 'ooh'n'ahh' yourself proudly. And yes, you can hit the ball between your legs.

Specs

XBOX

Developer:
PAM Development
N/A

Publisher:
Microsoft
www.microsoft.com/games

Distributor:
Microsoft
www.microsoft.com/games

Phone:
Microsoft Games
(02) 9870 2200

Quick to get into but room to master; Multiplayer.

Loading times; Career mode is over too quickly.

SCORE 8.5 10

Geez Pong has come a long way. They said it'd never make it, you know. But they said that about lawn tennis in the late 1800s, too. Proof positive that starting with a simple concept and loads of headroom for polishing can be better than starting out big with little room to move.

Pong 2003 is more formally known as Top Spin for Xbox, and Nolan Bushnell would be rolling proudly in his grave, if he were dead. Through the years we've seen many a tennis game, standout favourites are Smash Tennis on Nintendo, and the mighty Sega Virtua Tennis – still the greatest game ever released for Dreamcast, and reason enough to own one. The tennis format is exceptionally well suited to console gaming, particularly multiplayer, with the latest in the genre being a nice evolutionary cut and polish job.

Virtua Tennis' great contribution to console tennis was that it was first to impart the 'feel' of real tennis. Top Spin, as one would rightfully expect, further refines this. The only way to really play this game well is to 'think tennis'. Then it all clicks and both your on-screen skills and gaming satisfaction kick in.

Four basic shots are available. First, the simple flat shot – it's virtually impossible to hit the ball out with this, but it's by no means so conservative that you can't issue punishing winners with it. Then you can play the lob – classic and never to be abused, or you'll just invite an overhand smash in return. The last two are the trickery buttons – slice shot and top spin.

Alone, each can be employed at the right time to win points and add nice variety to the game, but they're especially devastating with the special shot enhancers, which the shoulder buttons provide. Use any of your standard shots in combo with the R-shoulder and it'll gain a major whallop, but with corresponding risk of going out if your aim isn't perfect. The L-shoulder turns a standard shot into a drop shot, or bastard shot, as is mostly the case.

Get good at using the range of shots and Top Spin rewards with magic gaming satisfaction. The default selection of mostly real players each specialise, so there's plenty of opportunity to mix up the way you play.

Enjoying one-off games in Exhibition mode as one of the impressive list of licensed real players is a nice quickie, but a bigger dose of satisfaction comes from Career mode, and the greatest joy from multiplayer. In Career you'll play around the world in minor, major and Grand Slam tourneys for cash and rankings. Playing online via Xbox Live you can compete in the XSN sports global rankings, for tougher but potentially more gratifying ranks and rewards. You can also play regular multiplayer via Live or the old fashioned way – crammed together on the lounge yelling and screaming. Unlike Virtua Tennis, multiplay displays the court side-on (Pong-like!), which is more intuitive.

A sensible and oh so very tennis touch is an ITZ (In The Zone) meter, which builds in strength during a game, as you pull off risky shots and generally be a crowd pleasing champ. As the ITZ bar rises, so does your power and accuracy during the game.

Top Spin is a winner because it allows you to play your game of tennis just as you want, or need, to beat your opponent. There's very little luck about winning. Just how gaming should be.

BM

Halo PC

Ed Dawson rides a dropship into a world made from a giant cylinder to bring you this review.

Specs

Developer:
Gearbox Software/Bungie

Publisher:
Microsoft
www.microsoft.com/games

Distributor:
Microsoft
www.microsoft.com/games

Phone:
Microsoft
(02) 9870 2200

☺ Slick port of the best-selling Xbox game, great for multiplayer action.

☹ Cooperative play, one of the best things about the Xbox version, has been chopped.

Halo is, of course, the best selling Xbox game and one of the few games that can be played on an Xbox 'LAN'. It's got great bump mapping and lighting, a fun story with memorable characters, great AI and arse-loads of attitude.

Where Halo really shines is in its multiplayer mode. The Xbox version lamely only featured two vehicle-enabled multiplayer maps, and some vehicles weren't included in multiplayer. On the PC, we have a total improvement of this situation. We now have eight vehicle-enabled levels, including the popular 'Blood Gulch', with a level editor soon to be released. There are also new weapons and an expansion of the set of vehicles available for multiplayer.

Especially, you can now pilot the Banshee aircraft in multiplayer mode. There is a new Warthog jeep, with a rocket launcher in the gunner position. New weapons in multiplayer include the overwhelmingly powerful Pink Gun Turret, an alien rocket launcher called the Fuel Rod Cannon and a flamethrower.

Halo has a nice range of multiplayer modes, which can easily be combined or mixed and matched through a simple interface. Up to 16 players can play in LAN or Internet games. But sadly, the cooperative mode from Xbox has been removed.

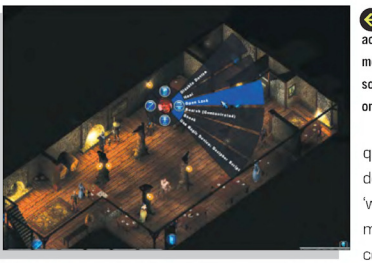
On the whole, Halo for PC is a good buy. ED

REQUIREMENTS: PIII 733MHz; 128MB RAM; 1.3GB HDD; 8x CD-ROM; 32MB 3D hardware T&L capable video card.
RECOMMENDED: P4 2.4MHz; 256MB RAM, 64MB video card.

SCORE 7/10

Temple of Elemental Evil

'Where are the damn half-ogres!?' cries Logan Booker.



Character abilities are accessed via a right click menu, be they used for social engagements, combat or thieving.

Spell effects, such as Magic missile and Web shown here, are very well done and look great.

Raincoats of Protection on – the flood of Dungeons and Dragons-based computer RPGs has begun. While we were still nursing our lightly pulped expectations of the Neverwinter Nights expansion Shadows of Undrentide, Troika Games has come in swinging with Temple of Elemental Evil (ToEE). With a tight, 18-month development cycle and the promise of a rule-set as faithful to D&D as possible, the temptation to hack into Troika and download the source code had been hard to resist. Well, the wait's over.

Troika has a wildly successful, if short, track record. The game studio ravaged the scene a few years back with its outstanding Arcanum, which was not only an engrossing and epic playing experience, but also, in our opinion, the best RPG released to date. That's why it was a little underwhelming to play ToEE, expecting the same standard of greatness found in Troika's previous title.

ToEE is based in the world of Greyhawk. The focus is on a town called Hommlet, and an evil temple on its outskirts, located in the dry, mountainous terrain of Flanaess. For reasons unknown, monsters have started congregating at this temple, so it's up to you and your party of five to role-play events to their dangerous, yet fun, conclusion.

The story is driven via the many NPCs you'll meet during your adventures. They assign quests, impart information, and on occasion, join your group.

The tasks you'll receive all contribute to your experience and reputation, if it wasn't for the abysmal voice acting and the fact the quests are boringly delivered in American 'whinge' dialect, you might be inspired to complete them. ToEE definitely has its highlights as you fight to do the right thing (or wrong thing), but an RPG needs to religiously rely on its story to push play onwards.

ToEE instead puts all its dragons in its combat system, ripped almost verbatim from the D&D 3.5 Edition pen-and-paper rule-set. This is both a delightful development and a blow to the nads. Seeing the effort Troika has put into the transition deserves a congratulatory slap on the back. Everything you could possibly want to do by 3.5 Edition standards is there, right down to manually breaking free from holding spells (like Web), setting combat stances, going on delay and casting defensively. Spells and combat effects, along with character and monster animation, are first-class. Cloth modelling is especially nice visually.

Unfortunately, when it comes to the other pen-and-paper rules, ToEE falls a little short. While playing, it's hard not to feel that too much emphasis has gone into perfecting combat, which has benefited from the attention at the expense of the rest of the game. Fighting in ToEE is extremely tactical – which translates to 'slow' in many gamers' books – and those familiar with Fallout's turn-based combat should be prepared for a slightly less engaging but more complex experience. It should also be noted that the maximum level for characters is 10, limiting the player to 5th-level spells. Multiplayer is also absent, and considering D&D is at its core an MP game, it's quite an oversight no matter how intentional.

Temple of Elemental Evil is a solid effort by Troika, and credit is due when it comes to the pen-and-paper combat system and D&D feel. Troika however probably could have done the game more justice with extra development time.

LB

Specs

PC

REQUIREMENTS: 700MHz CPU; 128MB RAM; 16MB video card; DirectX 9.0.
RECOMMENDED: 1.5GHz CPU; 256MB RAM; 64MB video card.

Developer:
Troika Games
www.troikagames.com

Publisher:
Atari
www.atari.com.au

Distributor:
Atari
www.atari.com.au

Phone:
Atari
(02) 8303 6800

☺ Rule-set dedicated to D&D 3.5; pretty models, characters and animation; deep tactical combat.

☹ Can be too focused on combat; sub-par voice acting; not as much polish as Arcanum.

SCORE 7.5 10

We believed it our duty to find out what a hornless artiodactyl is. According to Timothy H. Heaton, it has fascinating teeth. We think it might fly, too.

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Chrome

Ed Dawson likes hiding in the long grass with a rifle.

Massive draw distances and lush and bumpy terrain maketh for a game world you just want to savour.

A previously alive guy, now demonstrates Chrome's quality facial textures and a nice close-up of the ground.

Specs

PC

REQUIREMENTS: PIII 800MHz; 256MB RAM; 32MB DX 8.1 compatible video card; 1.7GB HDD.
RECOMMENDED: P4 1.5GHz; 256MB RAM; 64MB video card (GeForce 3 or RADEON 9000 chipset).

Developer:
Techland
www.chromethegame.com

Publisher:
Strategy First
www.strategyfirst.com

Distributor:
Take 2 Interactive
www.take2games.com

Phone:
Take 2 Interactive
(02) 9482 3455

☺ Savagely delicious outdoor scenes. Grass like you've never seen it grow before.

☹ Lame indoor geometry; slack AI; clichéd FPS weapons.

SCORE 8.5 10

Chrome is one of this year's spectacular games, delivering awesome tropical island scenery. The game has huge outdoor scenes packed with dense, detailed forests and greenery. There's undergrowth that sways in the breeze. You can even hide in it. Of course this is so that you can ambush, and er, kill people.

In Chrome, you're a bounty hunter who fixes expensive problems. As the story begins, you've just been double-crossed by your own partner – and he's very formidable. Hooking up with a femme fatale, you get back into business to finance your revenge. You'll invade various space outposts in mostly tropical conditions, kill dozens of people, grab the cash and get out, all with the sexy voice of your space-betty operator murmuring in your ear.

Although it's set in the space-faring future, there isn't a laser gun to be found in Chrome. It's strictly gunpowder and lead, straight out of the terrestrial first-person-shooter formula. You've got rifles, shotguns, grenades and rockets. You've also got controllable vehicles; there's a fast ATV with an independent turret, speedy rocket-bikes, imposing armoured personnel carriers with a crew of five and huge walking machines called Golems packing rocket launchers akimbo.

The vast environments in Chrome allow for interesting new twists in gameplay. The world is so large and so well stocked with objects that it's easy to miss enemies.

Your binoculars have a handy scanning feature that will single out living beings, which is lucky for you, because your enemies will often engage you at long range, when they're virtually invisible. This makes Chrome much more of a Tom Clancy rather than a Counter-Strike sort of experience – you'll crawl up to a vantage point, scan the horizon with your binoculars, perhaps engage an enemy at very long range, then move up to the next cover.

Chrome mixes visceral action with RPG elements along the lines of Deus Ex, with various 'implants' you can use. Your running speed can be increased, your weapon recoil reduced and your 'reflexes' can be improved. You also gain new abilities such as heat vision, computer hacking and an optical scope which, fitted to your eyes, allows you to zoom with every weapon – Terminator style. You'll also do some puzzle game 'hacking'. It involves a simple game of memory with a limited number of moves.

When looking for criticisms of Chrome, it's tough to find fault with the game. The AI is nothing to write home about, and the indoor combat scenes, with boxy rooms and hallways, are much like thousands of other FPS experiences. The pyrotechnic effects are also fairly underwhelming. Even so, these issues hardly detract from the game's essence – an exciting combat experience in a fantastic environment.

Chrome, after all, is a shootery action game. But it surprises you with things like its seriously excellent architecture design. This, combined with the superb natural environment and objects casting shadows onto other objects, makes Chrome look absolutely gorgeous. Chrome is definitely one of the best looking shooter games of the year. ED

Project Gotham Racing 2

Until now John Gillooly thought 'Cone Challenge' was a teenage rite of passage.

HOT AWARD

PGR 2's graphics are generally crisper and cleaner than those of the original game.

Driving tactics are now more varied, so no more mashing the handbrake every time the road curves.

Specs

XBOX

Developer:
Bizzare Creations
www.bizarrecreations.com

Publisher:
Microsoft Games
www.microsoft.com/games

Distributor:
Microsoft Games
www.microsoft.com/games

Phone:
Microsoft Games
(02) 9870 2200

☺ A quantum leap from original PGR; adjustable difficulty a great example of what Xbox Live can do; Sydney.

☹ Licensed radio stations annoying.

SCORE 9.5 10

Project Gotham Racing 2 is the third in a series of very different driving games that began with Metropolis Street Racer on the Dreamcast. The series has differed from the pack by focusing on stylish driving rather than purely on lap times. Outlandish driving is rewarded by kudos points, which can be used to purchase cars as you progress through the game.

Even though it was one of the most popular Xbox launch games, Project Gotham Racing had some major flaws that were a hangover from Metropolis Street Racer. Its focus on scoring kudos points meant that successful drivers were those who were masters of the handbrake rather than of the driving line. While it was an enjoyable way to play, it kept PGR from greatness.

Project Gotham Racing is an infinitely more mature game. Gone is the sideways fixation, you can still take every corner staring down the straight through your side window, but the kudos system now rewards technically correct driving just as much as it does hoonery.

It simply makes the game more rounded, allowing different players to focus on the driving style that they enjoy the most. In fact, this customisability permeates the entire game. Every single player race can be played at varying difficulty levels, each of which has a different goal and amount of kudos awarded. This allows for everyone, from novice to expert, to be able to proceed through the game without feeling like it is too easy or too hard.

But it is not just the game structure that has received a revamp. Graphically PGR 2 is crisper and cleaner than the original, with immaculately reconstructed tracks from around the world. Rather than do the usual driving game thing of spreading all the races over two or three cities, PGR 2 has a huge number of locales, including Sydney's Rocks area.

It is unusual to race in familiar streets, and it gives a remarkable insight into the level of detail that goes into the PGR 2 environments. It is spot on, from the curve of the road as it goes under the Harbour Bridge to the accurately modelled pubs on the route (one suspects that a large part of the research work by the designers was done in said pubs). The only thing lacking is the queue of heavily made up teenagers trying to scam their way into Jacksons on George.

PGR 2 is not only a well rounded single player game; it is a shining example of what Xbox Live is capable of. You can forget single player and complete the entire game online, progressing through the championships against real people, earning kudos and buying new cars if you want. Live also features in single player, where you can download not only content but also the world's top times for each race, and even the ghost of the player who set that time, so you can give yourself a real challenge.

Bizzare Creations has outdone itself with Project Gotham Racing 2. It has rounded and polished the game into one of the finest driving games out there (and certainly the best of its kind on the Xbox) while simultaneously delivering an online experience like no other. There is simply no better driving experience on the Xbox.

JG

When programming, before writing a custom function, make sure there isn't a routine already available natively. The worst thing you can do is reinvent the wheel.

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Garbage! You can fix anything as long as you have the right tools. Like sawdust for a shafty gearbox, or a screwdriver to turn back odometers. While our man Dan Rutter can't recommended you try any of the above 'tools', he can convince you that the Logitech MX700 is one nice device to win for IOOTM.

IOOTM:

Mad scientist department

I have been studying some chemistry, and have found out about exothermic reactions and endothermic reactions. Exothermic gives out heat and endothermic takes in heat. What if a custom liquid cooling rig was built which used an endothermic reaction? If suitable chemicals were found, could this be a very easy and cold method of removing that unwanted thermal problem?
Gabe Haines

ABOVE: **I said *endo*thermic, dammit!**

O Sure, this'd work, for as long as your chemical supply lasted. You'd need a couple of buckets of reagents, and you'd need to keep topping them up, and you'd need to do something with the waste, too.

One simple endothermic reaction – actually, it's not technically a reaction at all – is the one used in commercial 'instant cold packs' for treating injuries. The packs get cold when you squeeze them, because you've ruptured a seal inside that lets some ammonium nitrate (more often used as fertiliser or explosive. . .) dissolve in some water. Many things will cool water when you dissolve them in it, but ammonium nitrate is especially good at it, absorbing 26.2 kilojoules of heat per mole. One mole of ammonium nitrate weighs 80 grams.

One joule is one watt-second, so 26.2 kilojoules is 26,200 watt-seconds, which is the amount of energy a 100 watt heater (like an overclocked CPU) will emit in 262 seconds. An ammonium nitrate and water cooling system for a 100 watt load would, therefore, go through about 18.3 grams of ammonium nitrate per minute.

Of course, you could set up an evaporator arrangement to reclaim the ammonium nitrate (and distil back the water, as well, if you were feeling really clever). This is left as an exercise for the reader.

If you're going to use something consumable to cool a CPU – presumably because you're shooting for a ludicrous overclocking record – you might as well do it the traditional way and use liquid nitrogen. No messy mixing and metering required; just seal a foam cup to the top of your processor, and pour in more LiN2 whenever it looks like boiling dry!

I Insufficient entropy

How do computers (which can only calculate formulas) generate random numbers? They can't cycle through a list and stop at a random point in the list, because that requires a random number first. Is there a formula that can generate a random number?
John Guest

O They don't (well, almost all of them don't). They generate 'pseudo-random' numbers. Pseudo-random numbers may have a random *distribution* – generate a million ones and zeroes and you'll get pretty much the same number of each, as you should – but there will always be non-random patterns to the output – repeating sequences that wouldn't exist in truly random data.

This is because a normal computer has no source of true randomness to use as the input to a pseudo-random number generator (PRNG) program. PRNGs can twiddle 'seed' data into superficially-random-looking numbers as big as you like, but they can only produce output as random as the seed. Given the same seed, a PRNG will always give the same output.

The quick'n'easy way to seed a PRNG is to feed it some time-based number. If you seed a PRNG with the number of milliseconds that have passed since midnight, for

ABOVE: **Randomness comes in all shapes and sizes.**

4A 6F 68 6E 20 54 69 74 6F 72 2C 20 74 69 6D 65 20 74 72 61 76 65 6C 65 72

instance, you'll get output with a repeating 24 hour pattern.

This doesn't matter if the PRNG is just generating 'random' events in a computer game (though the *very* non-random spraying of bullets in games like Counter-Strike can be used to players' advantage), but it's important for things like cryptography. If the random numbers used for an encryption key aren't actually very random and an attacker knows it, they can restrict a brute force keyspace search to only those areas of the keyspace that the encoding computer could have actually used. This can result in surprisingly easy decryption of apparently highly secure data.

A PRNG seeded by something genuinely random will do a much better job. SGI's famous but now defunct 'lavarand' project used cameras looking at lava lamps as the randomness source, for instance. It's mutated into 'LavaRnd' (www.lavarnd.org), which is less hilarious but more useful.

Via's Nehemiah-core C3 CPUs also have a proper random number generator (RNG) built in; some software is now starting to support it.

Pixel fever

Why is it that my laptop (Dell Inspiron 8200) has a native resolution of 1,600 x 1,200 with only a 15in screen, and yet I can't find a single LCD desktop monitor that can handle a resolution this high? Even the best 19in Sony screens will only go as high as 1,280 x 1,024. I've been thinking (dreaming?) about replacing my 21in Sony Trinitron (also running at 1,600 x 1,200) with a couple of LCD flat screens – but not at the cost of a reduced desktop area.

Simon Hobman

Yes, 1,600 x 1,200 desktop LCDs exist – they're all at least 20in though, and generally sell for at least $3,000.

Just off the top of my head (he lied, after a brief burst of research), there's NEC's 20.1in MultiSync LCD2080UX, and IBM's ThinkVision L200p 20.1in (a cheapie, at only $2,300-odd!), and Hitachi's CML200B, and Samsung's SyncMaster 213T.

Apple have widescreen displays that fit the bill, too; the 23in Apple Cinema HD Display is 1,920 x 1,200, and the cheaper 20in Apple Cinema Display still manages 1,680 x 1,050.

ABOVE: 1,600 x 1,200 LCD lovin' can be yours. . . for a price.

1,600 x 1,200 desktop LCDs could be made a bit cheaper if they used laptop panels instead of the larger, coarser-pixeled desktop ones, but desktop monitors are typically viewed from further away than laptop screens, and the monitor makers don't want to bet that people will be willing to pay for pixels they can barely perceive.

Display devices *will* have invisibly small pixels in the fullness of time, but right now it's a pain to make everything big enough to be legible on a small, hyper-resolution screen at desktop distances.

Earthy inquiry

Power leads have three prongs on the plug – positive, neutral and earth. My understanding is that the earth is for safety reasons. Most metal appliances have the earth attached to the casing to let wayward current go to ground instead of through the user, however there is no such connection on metal computer cases. Is there one inside the power supply?

Thomas Crossman

Yes, there is. The earth contact on the power cable connects to the PSU casing, and thence to the computer chassis via the PSU casing's connection to the chassis, and several other paths. All of the black wires coming out of the PSU are connected to the same earth, and normally end up connected to the chassis via motherboard mounts, drive casings and so on.

It's *just* possible to foul this up if you've got a fancy lacquered PSU, mount it with low-conductivity anodised screws, put fibre washers on top of the standoffs under your motherboard, and mount drives in plastic fan cages or rubber-suspended noise isolators. If you've got little or no path to earth from the computer chassis, then a PSU failure that puts 240V on some output wire or other can result in a nasty belt if you touch the computer or a device attached to it. Live-case problems are much more likely to be caused by a defective power lead or mis-wired wall socket, though.

Woes * 2

I can't transfer files over MSN Messenger. I have Messenger 6.0 running on WinXP Pro, on Optus cable. I have two computers networked; this is not the Internet computer. I have Windows' built-in firewall turned off, so I don't think that's the problem.

Also, a couple of months back, I bought a new motherboard, CPU and RAM on a trip overseas. In excited haste at getting my new computer up and running, I got it out as soon as I got home, but after my 25 hour trip with no sleep, my brain wasn't exactly working. As I was attaching the heat sink to the CPU socket, my screwdriver slipped and made a tiny gash in the motherboard. The gash is only 5 mm long, as wide as the corner of the screwdriver, and half a millimetre deep, but it knocked off a little component between the CPU and the RAM. All I ever got from the new system was a memory error beep, so I was forced to buy a new mobo.

Well, time has passed and I am now wondering if I can repair my Asus A7V8X-X.

Tim Walsh

Your Messenger problem is probably because the Internet sharing computer is using Network Address Translation (NAT), through which MSN Messenger's fancier features don't work:

http://support.microsoft.com:80/support/kb/articles/q278/8/87.asp

www.dslreports.com/faq/4640

Microsoft's solution is that you stop using NAT and start using an old-fashioned proxy server, which is not convenient.

ICQ and AOL Instant Messenger have similar problems:

www.broadbandreports.com/faq/5736

. . .though you may be able to get ICQ to work:

www.petri.co.il/icq_file_transfer_through_nat.htm

You may also be able to use Trillian:

www.trillianskins.com/faq.php?1#faq10

Regarding the missing component – if you can find a proper circuit diagram or, more practically, just another A7V8X-X, then you could identify the missing widget and replace it. It's probably just one surface mount resistor or capacitor, and can easily be replaced. This assumes, however, that the gash hasn't damaged any tracks on the board, or at least only a surface track. If you've damaged more than one layer, it'll probably be extremely difficult for *anyone* to fix.

Simon says there's nothing wrong with some personalised touching up, now and again. So let's make a fist of it, and get some spunk happening.

Adding eye-candy to your browser

Both Internet Explorer and Outlook Express have a little animated logo which indicates if Internet/email activity is taking place. If your ISP provided you with an installation CD, you may find that they replaced this logo with their own. Let's Atomicify things a little, and replace it with our own spunky little animation.

You should all know the basic principles of animation, where one frame is different from the next. When displayed in rapid succession it gives the appearance of movement. The more frames, the smaller the changes between frames, the smoother the movements appear.

So the images we need to construct will be similar to a strip of film, composed of a sequence of individual frames. As the animation starts playing, the first frame is displayed, then the next frame, and so on. When it reaches the end, it loops back to the start.

To create our own animation, we need two BMP files, which are identical except for the size. One must be 22 pixels wide and the other 38 pixels wide, for the various toolbar sizes in Internet Explorer. The height will be determined by the number of frames you wish to use. In other words, if your animation contains 20 frames, one image would be 22 pixels wide by 440 pixels high, and the other would be 38 pixels wide by 760 pixels high.

When creating your sequence, stack the frames vertically, with the first frame at the top. However, if your creative inspiration has left you, or you have the artistic eye of a slug, you can download the ones I used here, from **www.atomicmpc.com.au/downloads.asp**. Once you have your images, save them into your Windows folder.

When the browser isn't active, such as when a page has finished loading, it will just display the first frame in your strip. Alternatively, you can create a different image to display when idling. Of course, the 22 x 22 and 38 x 38 pixel dimensions would apply.

Now take a well-trodden trip to your registry, and browse to *HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Toolbar*. Create two new string values, if they don't already exist and name them 'SmBrandBitmap' and 'BrandBitmap'. In the 'value data' for each of these, specify the full path and filename to relevant image files. 'SmBrandBitmap' represents the 22 pixel image and 'BrandBitmap' is the 38 pixel image.

If you have also created a separate non-animated image, browse to *HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Internet Explorer\Main* and create two string values named 'SmallBitmap' and 'BigBitmap'. Set each value as the full path and filename of your static images. To revert back to the boring old icons, just delete those string values from the registry.

Background ahoy!

Now let's get real clever and put a background across your Windows toolbars. Actually, it's not that clever, but it's pretty neat anyway.

This time, create yourself a BMP which is any old size you like. Whatever size you make this, it will be stretched and cropped to fit the full size of your toolbar. Don't make the image too dark, however, as it will make your buttons difficult to see.

Once again, we have put a sample for you to use on the website for the laziest of you. It may take some time to resize it to suit your screen size and resolution.

In the registry, under *HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Toolbar*, create a string value called 'BackBitmap' and set the value to the full path and filename of your toolbar image.

Happily, no reboots are required, and your new and improved animations and toolbars will be there in the very next Explorer window you open.

And finally, a quickie from the 'Potatocake'. . .

Add wallpapers to Display Properties window

'So, I'm sure that I'm not the only one who is tired of searching forever to change their wallpaper, and gets irritated by the fact that it'll remove my last wallpaper from the list once I choose another one.

This will allow you to add whatever wallpaper you want onto the list without fearing that they will disappear, or having to look for it again through tons of folders. Here's how you do it. . .

1. Right click and copy, the wallpaper that you like and would like to add to the list.
2. Go into "C:\Windows\Web\Wallpaper"
3. Paste your wallpaper into that folder.

That's it! Now, you can go through all of your wallpapers and just add them to that folder, and they will remain on the list even if you choose another wallpaper!

No more tiring searches for your wallpapers.

ABOVE: Tim McPherson, Atomic Designerman's exquisite toolbar, ready to download from www.atomicmpc.com.au/downloads.asp and add to your browser.

ABOVE: Phr33xie's practise attempt toolbar, complete with fiddly bits which obscure the buttons, incorrect typography of the logo and 'eyes of Phr33x'.

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Solder on

Real modders do it *all* themselves. Phil Chia shows how to banish the silvery blob and flex your flux.

This is part of a short series that we're going to run on getting a bit more into the hardcore side of things – namely electronics. Perhaps the most valuable skill that a modder can have up his/her sleeve is that of soldering. Of course, most people are just happy to leave their mods at the odd hole or Molex connection to hook up a CCFL or a fan, but truly hardcore modders will appreciate that there are some mods that you just can't get by mail-order!

For instance, my trusty HAL10,000 Xeon rig that comes with me to LAN sessions gets tons of chi-chi points, primarily because it's got home-rolled mods that simply aren't on the market (Like my PiMP patented 4.5in TFT case status monitor).

But more importantly, soldering makes stuff reliable. It's estimated that as much as 80 percent of electrical failure (non SMD system) can be attributed to faulty soldering, or to *no* soldering. Wherever possible, wires and circuits should be soldered together, not just reliant on mechanical connection (twisting, bonding, heat-shrinking).

But just the thought of dealing with molten lead and poisonous fumes can be off-putting to most. So, with a little bit of direction and know-how, we'll show you how to make more reliable mods and how to make some of your own custom circuits in the next few issues.

Why soldering?

Soldering is the basis of all of our modern circuitry, because it's been proven over the decades to be reliable and efficient (read, cheap!). Soldering makes a sound electrical and mechanical joint between components. Electronic soldering is based on 60/40 soldering, so called because the solder alloy contains 60 percent tin (Sn) and 40 percent lead (Pb). This alloy's composition is ideal as it bonds to copper easily and offers good corrosion resistance whilst still being able to melt at a relatively low temperature. 60/40 solder melts at about 180°C, but it's often best to use it at about 210-250°C. Corrosion resistance is especially important, considering that most electronic circuits use copper, which is notorious for oxidising rapidly into non-conducting oxides and sulphate-salts.

Solder is also available with other alloys, but the next most common is the more expensive Sn62/Pb36/Ag2. It's similar to normal 60/40, but has the addition of 2 percent silver, which makes it a better conducting solder for resistance-critical applications, such as building high-end hi-fi or sensitive lab equipment. Although straying too far away from 60/40 isn't too good an idea as it means using different temperatures and different techniques.

Solder

Electronic solder also contains flux which acts as a sort of wetting agent to help clean and prepare the surface so that the molten solder can stick to the parts. It's important that you get *electronic* solder, as there is also 60/40 craft solder that doesn't contain flux. Also there is acid based or corrosive flux that is often found in hardware stores. *Never* use these types of solder on electronics, as the flux will slowly eat through your circuits.

Although not strictly absolutely necessary, soldering without flux does increase your chances of creating a cold joints (*see later in this article*).

A couple of warnings first though. First, lead is toxic. Handling solder with bare hands probably won't result in lead poisoning, but chewing on it is not the best idea. It's also good practice to wash your hands before you handle any foodstuffs, but then again, it's good practice to wash your hands before you eat anyway! Second, at proper soldering temperatures, the flux will tend to burn off creating flux fumes. This stuff is toxic, corrosive, and pretty irritating to the airways, so work in a well-ventilated area. If you suffer from asthma, it's a good idea to put a small desk fan next to your work area to blow fumes away from you. Don't overkill on this though, because if you whack a hurricane fan on your desk, you'll cool the solder before it's had a chance to melt. I use a nice 200mm fan salvaged from a DEC server. Third, your soldering iron's going to be *hot* – at least

250°C – so for goodness sakes, protect your bench surface, and don't solder stuff in a cluttered environment with papers everywhere! I use a rubber cutting mat because I prefer the non-slip surface, but covering your bench top with four layers of aluminium foil with four sheets of broadsheet newspaper

ABOVE: Solder comes in different forms. At the top is solder paste, used with surface mounted circuits. So toxic, you need gloves to use it (hence the bag). Next below is 1mm and 0.71mm solder. Below that is 0.25cm and 1.5cm desoldering braid.

underneath works pretty well. Also, try to work in an area with no carpets (soldering iron scorch marks are not pretty), and no kids/pets running around. Finally, never leave a hot iron unattended.

Solder also comes in a variety of gauges, however, for most hand-soldering use, I've found that 0.71mm (22swg) is the most useful. 1mm (18swg) is probably the largest gauge that one would use. I wouldn't advocate the use of 'hardware supply' solders (2-4mm) unless you're actually tinning a circuit board (*more about this in a future article*).

The iron

Choosing the right soldering iron is critical to successful soldering. Irons can vary from the budget hobbyist $20 special, all the way up to $400 for the top-of-the-line ESD IEEE certified, digital temperature controlled workstations. SMD tong irons are specialised for surface mounting work found in most computer peripherals. SMD circuits will be covered in a future article. Soldering guns are not suitable for electronic use.

One of the most important things to look for is the wattage. Wattage doesn't relate to temperature; it merely means that the iron has a lot more in 'reserve' when tackling big jobs. When dealing with large components (capacitors, heavy gauge wires) or even special low resistance, wide-track circuits, the track or components that you're trying to solder can actually draw away the heat from the join point, and it subsequently takes longer to get the joint up to melting temperature. This is one of the most common causes of component failure as, instead of heating just the joint briefly, the entire component is exposed to the heat of the iron. Exposing an IC or a capacitor to 150°C for anything more than a second or two usually results in a fried component. Worst case – it can result in exploding capacitors when you test your circuit.

Most beginner irons, such as my ol' faithful Weller SP15D, have 15W elements. That is OK for small jobs and beginners, however for more general-purpose use, look towards a minimum of 25W. Larger 80W irons can be a bit excessive and usually, their huge bits aren't suitable for fine electronics use.

Anatomy of an iron

A soldering iron comprises two main parts. The handle, which usually contains the heating element, and the bit that focuses the heat and melts the solder. Always look for a good quality iron that has interchangeable tips. Not only will this enable you to use different bits for different situations (chisels; finer SMD tips; spade and wide tinning bits for coating circuit boards; and hook bits for tinning long runs of wire), but it will extend the life of the iron when the bits wear out or break.

Cheaper irons will feature screw-in bits or bits held in with a screw, with more expensive irons using a sheath system. If you have the former, it's important to always loosen or remove the bit as the iron is cooling to avoid it seizing permanently inside the handle. It's also important to never allow solder or flux to enter the handle in these irons as that will also seize the bit and ruin the iron.

Generally, a fine conical bit is the most useful for nearly all PCB soldering, with a chisel or a hook bit being most suitable for tinning wires.

Most soldering irons plug straight into a power socket, however investing in a soldering station may be worthwhile if you plan to work on complex circuits or frequently work on circuits in general. This is because most stations come equipped with a more comfortable and lighter handle, better sheath tips, temperature control and a good soldering stand. Variable temperature control is useful when dealing with delicate components (such as ICs) or with different solders or large wires.

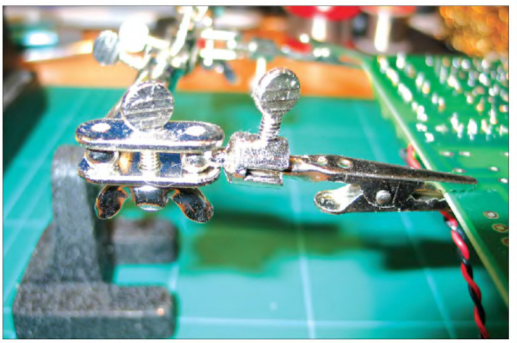
Good quality irons that I would recommend are made by Weller, Antex, and Hakko.

Other bits

A soldering stand is *essential* to any kit. A good stand will have a sponge for cleaning tips between joins, and will prevent the hot iron from falling off a desk and causing burns. A 'helping hand' is also good to use to raise PCBs off your desk and allow easy positioning. I use two for added stability with PCBs and also find them useful when tinning wires. Don't ever try tinning wires without using one of these, as the wire will conduct the heat down the line and burn your fingers.

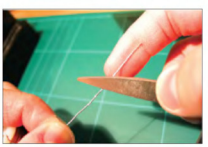
Soldering

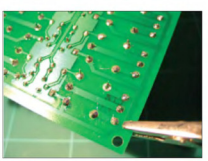
There are three key rules to making good joins: cleanliness, cleanliness and cleanliness!



ABOVE AND BELOW: Good 'helping hands' feature ball joins to allow almost unlimited positioning.

It's important to make sure that all surfaces to be soldered are clean and free from corrosion and that all surfaces are bright and shiny, otherwise the solder won't take. It's good practice to lightly sand or scrape the legs of components to reveal a fresh, shiny surface.

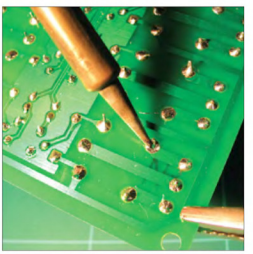




ABOVE: The shiny bit is the pad; the tracks in this PCB are covered in green.

Commercially made Printed Circuit Boards (PCBs) usually are lacquered to prevent against corrosion; if there is, a quick *light* rub with an emery board will clean it off. Incidentally, the metal bits on a PCB are known as tracks, and the points where the component legs are soldered on are known as pads. Finish off the surfaces with a quick rub of isopropyl alcohol to remove any fingerprints.

Make sure that your iron is up to temperature, then run it quickly over the moist sponge. Bits are usually 'tinned' with a coating of solder and this quickly oxidizes when hot. Wiping the bit removes this and ensures that your join is clean.

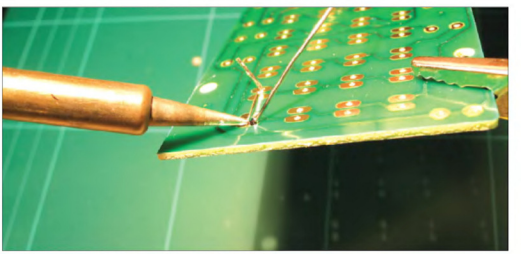


Hold the iron like a pen, and touch both the pad of the PCB as well as the component's leg for about a second or so.

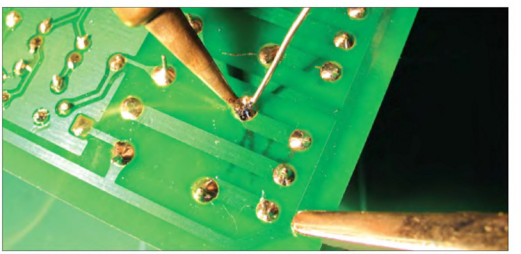
Then place the solder on the *opposite* side of the leg and let the heat of the component and the pad melt the solder. This ensures that everything at the join is up to the right temperature.

Do not melt the solder on the bit. You may get what looks to be a good join from doing this, but it will often result in a cold joint.

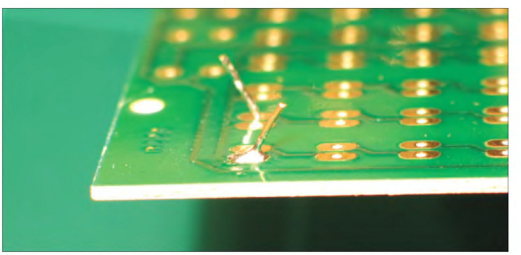
A 'cold joint' is what occurs when the solder merely coats instead of bonds to the components. A cold joint may work temporarily, but will eventually fail.



The solder should melt and flow freely around the join. Feed the solder into the join until it coats the pad and surrounds the leg.



Now smoothly remove the solder followed by the bit. You should end up with a shiny join.



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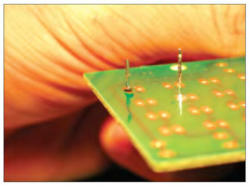
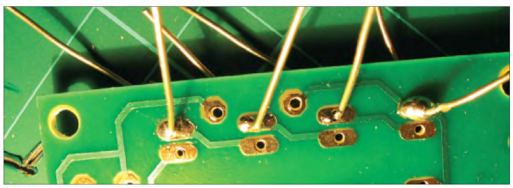
Bad joins



Be sure not to make your iron too hot, or leave it on the pad for too long or else you will damage the PCB. Usually, pad lift occurs. This is when the heat of the bit loosens the adhesive sticking the track and pad to the PCB. Damage is usually permanent, and the PCB is ruined, however, I have heard of superglue being used in desperate circumstances.

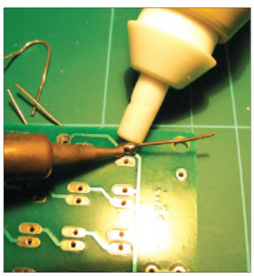
It is always important to deliver *just* the right amount of solder into the join. Too much solder results in an overloaded join that isn't stable and can lift the pad from the PCB. Too little, and the entire component can just pop out of the joint. Also, if the components are dirty, or jarred whilst the solder is cooling, it can result in a cold joint.

Comparing a cold join to a perfect join (*see below*), note how the surface appears bumpy, grey and discoloured. These joints will either not conduct or fail later, which will either make the circuit work intermittently or, in the worst case, may destroy ICs on the PCB.



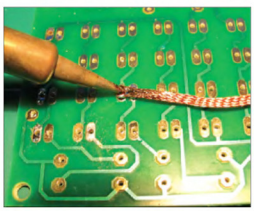
ABOVE FROM L-R: A cold join, a perfect join, too little solder, too much solder.

Bad joints can only be corrected by desoldering the join and starting from scratch. One of the easiest ways is to use a solder sucker. Solder suckers vary in price from $5 rubber bulbs, to the $70 one here in the picture (*left*), which is shielded against static electricity and has a high velocity spring plunger. In general, the more expensive the sucker, the stronger the suction generated and the stronger the suction, the easier it is to desolder. Either way, both the cheap version and its pricier counterpart are used the same way.



A good tip is sometimes, it's actually easier to remelt the join, add more solder, then suck it all up.

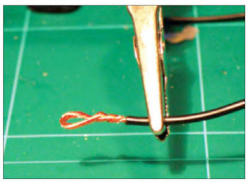
If the component doesn't come free easily, then desolder braid should be used. Braids are all pretty much the same and consist of a flux-coated copper braid. Simply place the braid over the joint, then put the hot bit on top. As solder has an affinity for copper, braid simply uses capillary action to wick the solder away from the join.



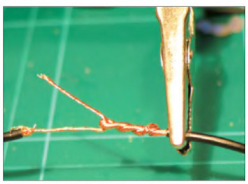
ABOVE: See the molten solder being wicked up.

One last tip: making reliable wire joins

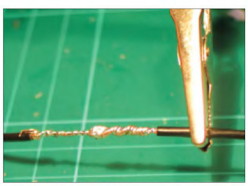
One of the major causes for mod failures is faulty wiring. It seems that there's a seething mass of people out there who either don't want to or can't go beyond just twisting wires and shrink wrapping the lot. I'll cover two quick techniques that I learnt in Electronic Engineering, which have been MilSpec approved.



The Loop: (*see left*) take one side of the wire and bend it back onto itself, creating an eye much like you would find on a needle. Wrap it a few times to strengthen the tie.

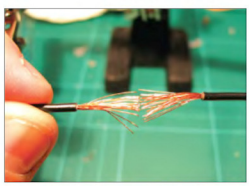


Now snake the other wire through the eyelet and twist both sides together, interlocking the wires. Use pliers to flatten the area where the two eyes meet if necessary.



Solder the wires together, starting in the middle, and running the bit over the entire length of the join, making sure to avoid the insulation and heat shrink the whole lot.

The Splay: (*see below*) obviously, this technique only works with stranded and not solid-core wires. Take off about 1.5cm of insulation from both wires and splay out the individual strands, making sure not to jab yourself with any of the fine wires.

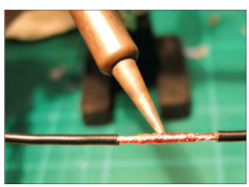


Mate the strands together and then smooth them to make one bundle. Next twist the strands together.

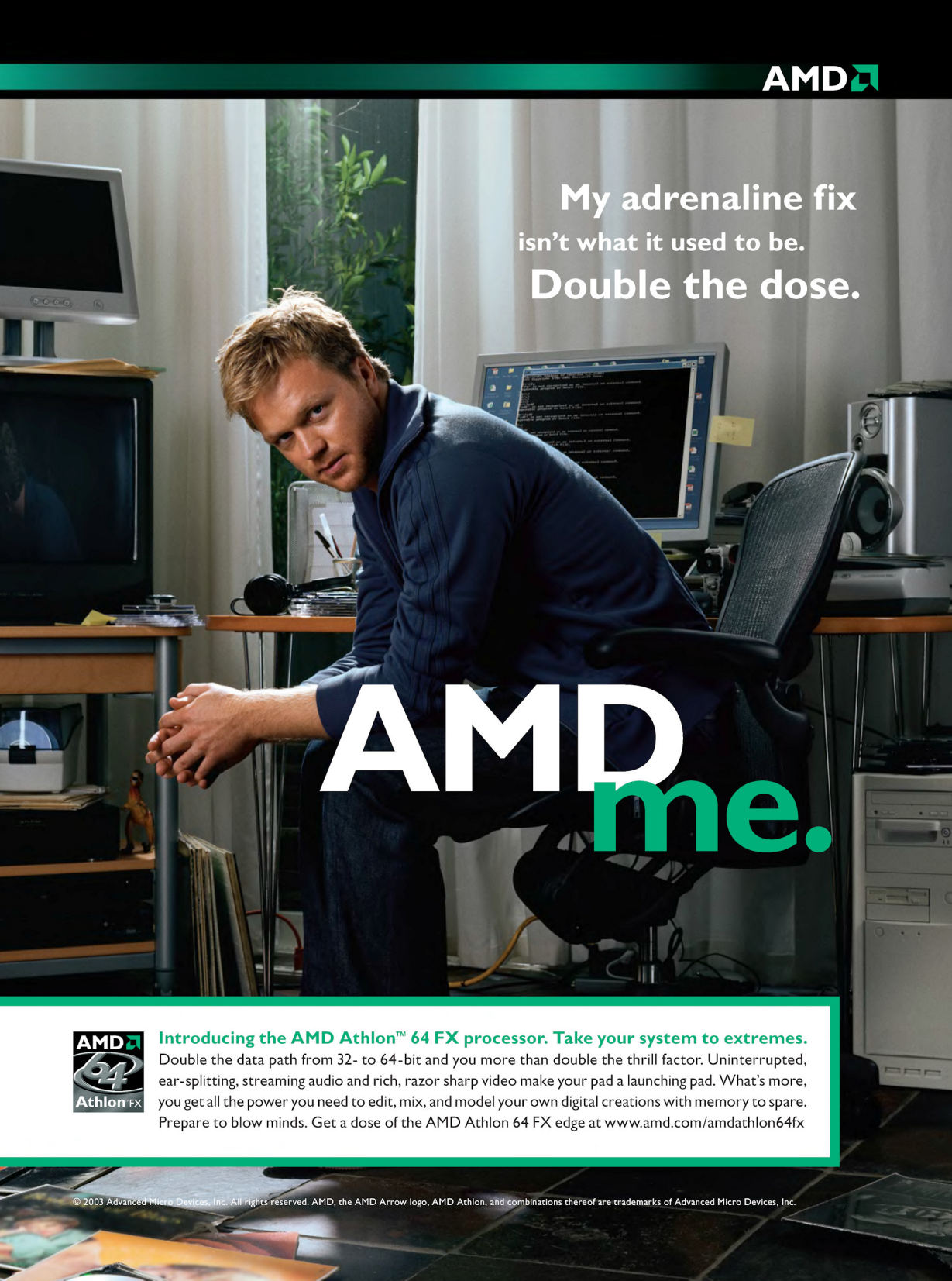
Solder the wires together, starting in the middle, and running the bit over the entire length of the join, making sure to avoid the insulation.

Voila! A strong join that's ready for heat shrinking.

I always recommend heat shrinking wire joins, not only because it looks professional, but it prevents shorts from happening. Also, the added insulation provides good physical strain relief and prevents metal fatigue of the wire.



What I've covered here should be just enough to get you started on reinforcing some of your wire splices and some basic solder/desolder mods. Always remember, soldering is a skill that comes from practice, but as long as you stick to the basics outlined here, you should be able to build reliable circuits in no time.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Q: What three things does a fire need in order to burn?

Ten copies of Age of Mythology: The Titans

Being a god is easy – all you need to do is take one copy of Age of Mythology and combine it with its expansion, The Titans. They won't fit in a bowl or other mixing device comfortably, so you'll need to use your manly (or womanly) super-god powers and force them together in a massive, brightly symbiotic joining. To help you in this two-part metamorphosis, we're giving away 10 copies of AoM: The Titans. Mad props to Microsoft for supplying us with these godly tools.

Q: In Greek mythology, who was Persephone's husband and what was he responsible for?

Six copies of Chrome

We don't know about you, but we prefer our first-person shooter protagonists to chrome up instead of oiling up. With a strong, sexy name like Bolt Logan, how can you go wrong in metallic? Sounds like your twang? Then join in on the ecstasy of prancing through jungle in a full metal jacket and win one of the six copies of Chrome we have right here at *Atomic* HQ. A big gorilla roar of thanks to Take2 Interactive for delivering these marvellous gifts.

Q: What is the main element involved in chroming?

Six copies of Space Colony

Space is all about adventure: fighting monsters, flying spaceships, finding weird alien life-forms and, of course, getting 'jiggy' with them Kirk-style. Space can also be cold, vacuous, dusty and lonely – but only if you make it! The best way to enjoy the great black beyond is to experience it on your computer, a task easily accomplished if you were to win one of the six copies of Space Colony we have on offer. Another ecstatic scream of gratitude to Take2 Interactive for providing us with these fun modules.

Q: Approximately how long does it take light from the sun to reach earth?

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Atomic 33 winners: Year of web hosting at Sniper HQ Q. In the Simpsons, who was the winner of the Millhouse 500? A. Millhouse. M. Varas, Kingsford NSW. 11x Activision FPS bonanza Q. What is the name of the recent, free, multiplayer-only expansion for Return to Castle Wolfenstein? A. Wolfenstein: Enemy Territory. A. Donohue, Carseldine, QLD; A. Archer, Tranmere TAS; J. Ewins, Mona Vale NSW; D. Kearney, Victoria Park WA; D. Lakoumentas; I. Merrett, Pialba QLD; M. Zhang, Campsie NSW; C. Mitchell, Flinders View QLD; D. O'Brien, Murrumbeena VIC; R. Lee; K. McGeary, Bellerive TAS; B. Leykam, Dee Why NSW. 3x Warcraft 3 prize pack Q. Which race in Starcraft has the Zealot as a unit? A. Protoss. K. Tang, Higgins ACT; R. Fesus, Wollongong NSW; J. Trieu, Homebush NSW. 1x Cooler Master Musketeer Q. What are the names of the three musketeers? A. Athos, Parthos and Aramis. H. Sargent, North Perth WA.

Nikon digital winner: 1x Nikon Coolpix 3100 Q. What kind of Camera is being photographed on pages 38 and 39 of this issue (issue 33)? A. Kodak Brownie. S. Clark, North Hobart TAS.

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QUANTUM PHR33X

John Simpson brings us one step closer to feeling like Trekkies. . .

Let's go on a journey back through time, back to the days of secondary school (quite a while for some of us). Picture your physics teacher: a bespectacled bald man, ranting on about mass and acceleration, and how fat people will never be able to travel faster than the speed of light. Picture the score on your final exam, and recall with brutal realisation the knowledge that you'll never understand the physical world.

Well, here's a shock. That stuff you tried to learn? It's all crap.

Not so much at the bus-sized level, but when you start talking about tiny particles – like light and M&Ms – you enter the realm of unpredictability. A world where up is down, Simon Crean is PM, and nothing makes the slightest bit of sense. The world of quantum physics.

Quantum physics popped up in the year 1900, when German physicist Max Planck (not to be confused with his brother, Warkthe) proposed that energy comes in little packets, called 'quanta'. Light is a good example – its packets are chock full of photons. Kind of like a little Lotto barrel that's moving really, really fast.

These packets of photons merrily bob around, bouncing off stuff in a virtual mosh pit of radiosity. But here's the conundrum: it seems that each particle in the packet likes to do its own thing – but what that thing is, we don't know. Throw a packet of light at a mirror and some photons get reflected, and some slip through. Trying to predict which ones go through is like predicting your girlfriend's mood: impossible.

In the world of classical physics, if you can't predict what a particle is going to do you're likely to get a smack to the back of the head. Einstein, a true classical theorist, said it was like someone rolling a billiard ball at you with your eyes closed: until you look at the ball, it's neither red nor blue, and it's both (uh. . . right). It's only when you see the ball that it 'becomes' a colour.

Fantastic. Essentially, we have a sub-atomic world that behaves like a cross dresser on heat. They can't decide what skirt to wear with what shoes – so instead wear them all. . . and wear nothing. . . at the same time. And here I was thinking my life was confusing.

So now you're holding your head in your hands and rocking back and forth, asking what this has to do with you. At this point in time, thankfully, not much. Snooker is still a dull game, and guys in skirts still give me the willies. But all this is about to change, as new technology advances into the quantum age.

First on the list is the quantum computer. In theory, a quantum computer would be a technological revolution, just like the in-dash cup-holder. Imagine each electron in the computer is a 1 or a 0. With quantum physics the electron exists in both states, until you look at it. So each 'bit' can do two operations. Two bits can do four, and so on and so on. A regular rabbit hutch of bits – essentially massive parallelism.

There's only one problem: once you observe the answer, you influence the behaviour of the entire system. Each electron reverts to a singular state, and your massive parallelism becomes a beaker full of sticky liquid.

Another example – matter transportation. OK, at this point some of you are tossing your magazine out the bus window, disgusted at the ravings of this *Star Trek* nut. But amazingly, it's been done (not the tossing, the transporting). Last year two teams of scientists, in Rome and Innsbruck, managed to teleport a photon from one side of their labs to the other. Utilising the freaky way that particles can share quantum information, the researchers literally beamed-up a light beam!

Great stuff, but people are a lot bigger than photons, and transferring that much quantum info looks damn near impossible. Who knows, maybe in 10 years we'll be able to transport small things like buttons and grapes. Great for the textiles and sultana industries, but not as glamorous as appearing in the middle of the MCG in drag.

So next time you use a mirror or watch light stream through a frosty window, give someone a nudge and say 'that's quantum physics'. Then you'll know how we *Star Trek* fans feel. . .

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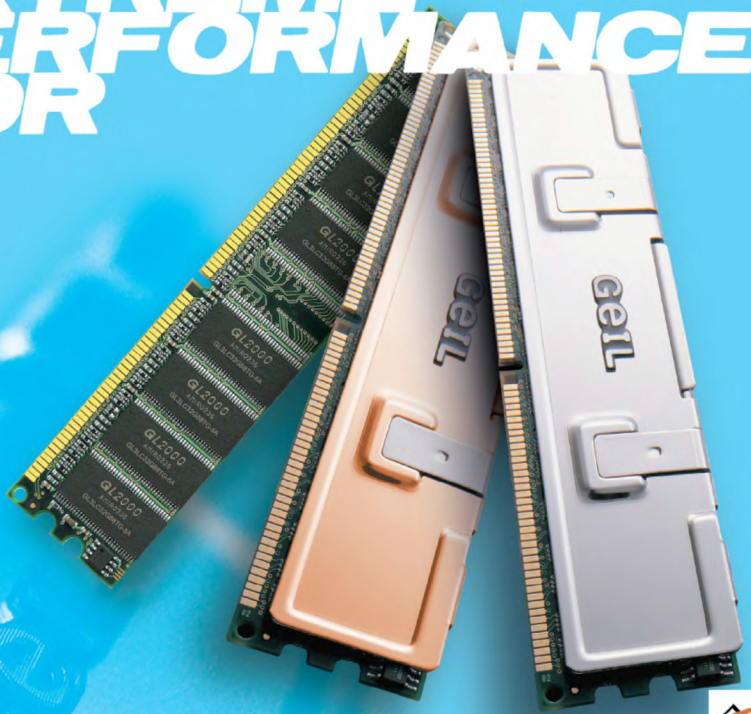

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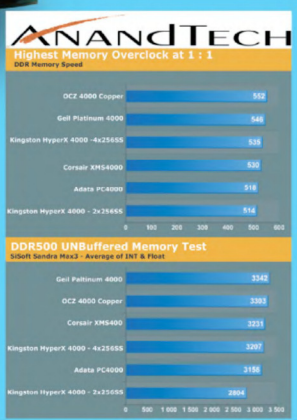

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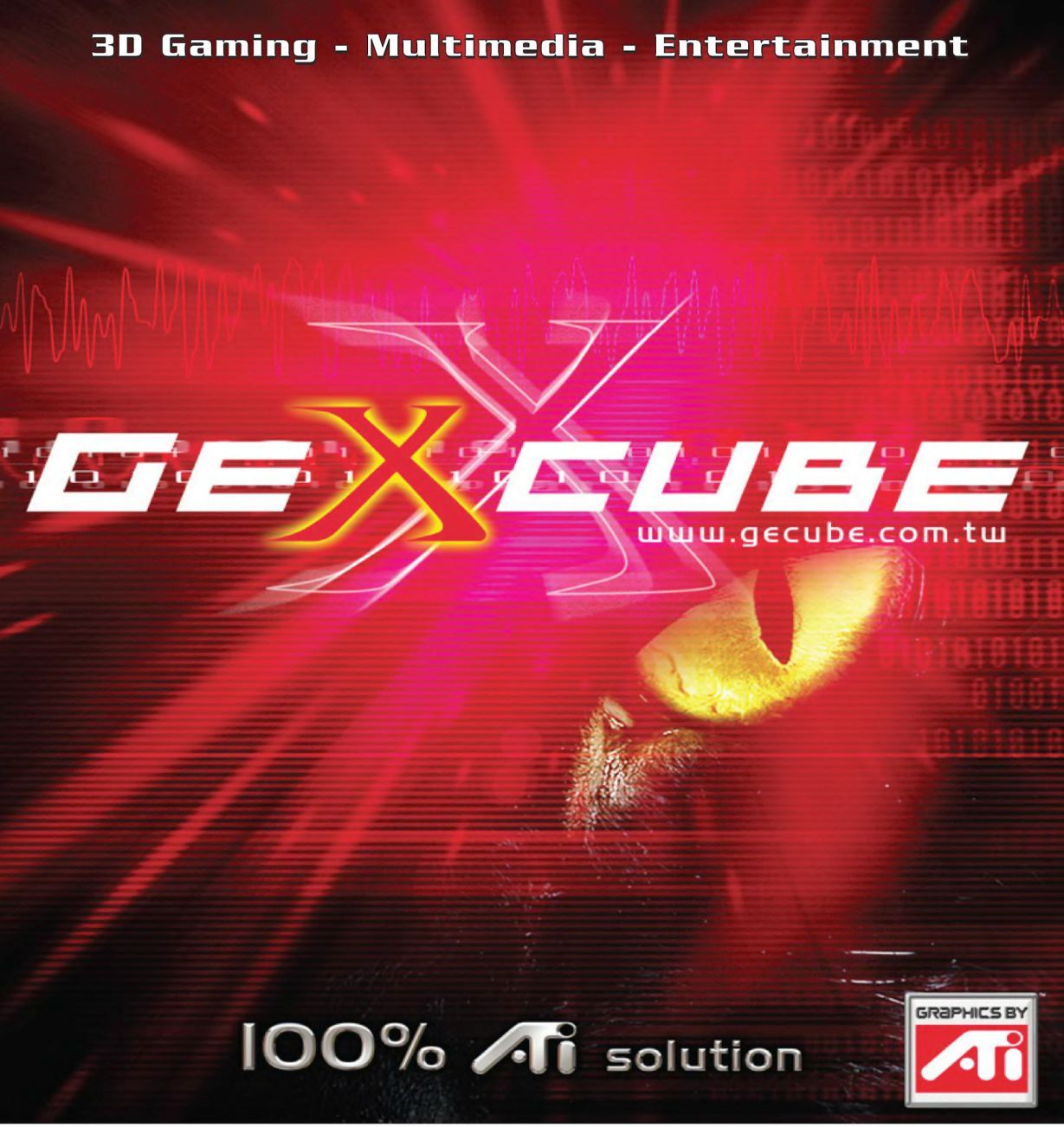

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